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Optional accessories shown. Always ensure that your vehicle is equipped with appropriate tires and equipment and always adjust your speed and driving style to the road, terrain, traffic, and weather conditions. See Owner's Manual for further details and important limitations. ©2016 Volkswagen of America, Inc.

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THE BATTLE OF THE OFF-ROAD BEATERS

Wherein we go anywhere and do anything for just \$1500.

by Jared Gall

On the Cover

Screaming Yellow Zonker.

photography by Tom Salt

Car and Driver[®] vol. 62, no. 6

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“In between momentary blackouts and involuntary grunts, though, we never realized the truck had left the ground.”

—JARED GALL, “THE BATTLE OF THE OFF-ROAD BEATERS”

084



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CarandDriver.com/Ram1500SSV

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CarandDriver.com/2017Envision

2017 FORD F-150 3.5L V-6 ECOBOOST

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CarandDriver.com/2017F15010speed

Jeremy
CLARKSON

Richard
HAMMOND

James
MAY

A M A Z O N O R I G I N A L

The Grand Tour

WHAT COULD POSSIBLY GO WRONG?



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Backfires: The joyful noise of the commentariat, rebutted sporadically by Ed.



ON THE COVER

So, I was thrilled to see what I believed to be one of my first cars on your September cover. It had been repainted cherry red, but it was definitely my long-lost Opel GT. I couldn't find any Opel info in the issue, but the photo was enough for now.

—Rick Paul
Daytona, FL

So, Mazda is bringing back the Opel GT? Cool! Will the company sell it at Buick dealerships, as it did back in the day?

—Peter DeVore
Yakima, WA

I'm putting the Over/Under for Ford GT covers in 2016 at 5.

—Chris Goslin
Stamford, CT

**Please send your
wager to—Ed.**

I must take umbrage with the front cover of the September New Cars issue, specifically with its promise of "Tons of Updated Model Info." The whole issue only weighed 198 grams, and this included "tons of updated advertising" as well. I would continue to effervesce biliously on this subject, but I have to go get my fingernails buffed.

—Stacy Feldman
Bakersfield, CA

NEWEST IN NEW

Waiting for the grammar police to hound you over the use of octopuses in your 2017 Acura NSX entry ["New Cars for 2017," September 2016]. You know those scholarly types who profess the use of Latin in everything and feel that octopi is correct. Octopus is Greek, so to be grammatically correct by word origin, it should be octopodes. But hey, we're red-blooded Americans and are sticking with octopuses. Plus, I'm a "Squid" and know a thing or two about my cephalopod cousins!

—Don Folliebout
(Retired U.S. Navy)
Hemlock, MI

**We're still calling
you guys the
Follebi—Ed.**



**"SO, MAZDA
IS BRINGING
BACK THE
OPEL GT?
WILL THE
COMPANY
SELL IT
AT BUICK
DEALERSHIPS,
AS IT DID
BACK IN
THE DAY?"**

News flash: Anyone able to plunk down 215 large for an Aston Martin DB11 has no concern about the "suck rate." Now, if the price of gas shoots up to, say, \$2.13 a gallon, that should make your observations on fuel economy much more significant.

—John McAdoo
Blain, PA

**Suck ratings
are always
important—Ed.**

Hey, nice *Mr. Mom* reference on the BMW page in the September 2016 issue. "B46, B58, Whatever It Takes."

—Jeff T.

New Port Richey, FL
First it's obscure Mr. Mom references, next thing you know you'll be strung out on bedspreads, Jeff—Ed.

I read your September issue upon returning from a lovely trip to Sedona and Flagstaff, Arizona. I was surprised to read that a pickup version of the Jeep Wrangler should be available in 2018, having seen one on July 31 in Flagstaff (registered in Utah, interestingly). See the attached photos. I'll resist the temptation for a snarky comment about the currency of your information, as y'all seem unable to resist one-upping your readers in that regard.

—Jeff DiGiovanni
Athens, OH

Smart move, DiGiovanni, because the photo you sent isn't a Jeep creation. It's a Wrangler-based pickup called the Brute Double Cab that's made by

the aftermarket company AEV—Ed.

Please tell me that the Smart Fortwo Brabus Edition is the new Mercury Grand Marquis with the De Sade package.

—Paul Escondido, CA

If you mean it was worth the pain of waiting, then yes—Ed.

I was leafing through the 2017 New Cars issue (okay, I admit I actually read most, if not all, of it) and arrived at the Toyota section wondering what new spin on mediocrity the company will be coming out with. After my eyes recovered from the searing bluish-green color of the Prius Prime, I'm at least happy that the rear isn't quite as hideous as the new regular Prius's. Here in Southern California, I spend a lot of time frustrated behind Priuses and marvel daily at how the new model looks like it's been rear-ended and given an atomic wedgie. What were they thinking? It's the new Pontiac Aztek!

—Derek Schatz Irvine, CA

SPIDER HOUSE RULES

An Italian sports car (at least the engine is Italian) with no power below 2500 rpm ["Attack of the Clones," September 2016]! Heaven forbid! I wonder how long it took Fiat's engineers to intentionally develop that feature to make the car seem more exotic. If you don't know how to use that thing sticking up between the seats, there are transmissions available that will shift for you. Glad you at least liked the seats.

—Ray Daugherty Lenoir City, TN

The thing between the seats can't improve an often-unresponsive and weak engine—Ed.

For those keeping track at home, "Attack of the Clones" marked the 10th consecutive comparison-test win for a Mazda on your pages. By the time you publish this, I predict the new CX-9 will have made it 11. Despite such consistent acclaim, Mazda still only accounts for 2 percent of U.S. new-car sales. Will consumers ever care

"DESPITE SUCH CONSISTENT ACCLAIM, MAZDA STILL ONLY ACCOUNTS FOR 2 PERCENT OF U.S. NEW-CAR SALES. WILL CONSUMERS EVER CARE ABOUT STEERING FEEL AND THROTTLE RESPONSE?"



B

THE HATCHBACKS OF HAUGHTY CLAIMS

The high-riding luxury hatch squats into a smaller, more affordable segment. by Eric Tingwall photography by Mary Urbano



about steering feel and throttle response? Probably not, but when you're a Mazda fan like me, even the good news can be depressing.

—Trevor Pontifex Claremont, CA

Ever since the first whispers about a Mazda MX-5 Miata platform-mate being in the works, I've dreamed of seeing a matchup between the two. Your feature did exactly that and answered all but one of my questions: When will FCA be offering the 1.7-liter 237-hp turbo four from the excellent Alfa Romeo 4C in this vehicle? It would seem the obvious choice to solve its lack of gumption.

—Scott Knell Warren, OH

Rumor has it that early in the 124 Spider's development, it was going to be an Alfa Romeo, but when the 1.7-liter engine didn't fit, the team didn't quit and the car became a Fiat—Ed.

I just don't get why you keep raving about the new Miata—excuse me, MX-5. Using old Miatas, and other sports cars, as

a yardstick, it's a huge disappointment. The body roll is simply unacceptable. And 0.89 g on the skidpad? Lots of front-wheel-drive sports coupes and family sedans can do that. I took a test drive and was reminded of my old MGB from the 1970s. The drive wasn't that dissimilar. A sports car should handle "flat." You should not be aware of any body roll at all. You can get a cheap rental car and get the same sensations. If the Fiat 124 Spider has less body roll, as you say it does, it wins.

—David Dicks St. Louis, MO

I knew Fiat Spiders. I worked with Fiat Spiders. Chrysler, this is no Fiat Spider.

—Bill Denney Bellingham, WA

Check out Denney with the fresh Lloyd Bentsen riff—Ed.

Imagine that, Fiat ruins the Mazda Miata!

—Pete Moler Naperville, IL

NOISEMAKER

I believe that the Jag XJ220 was and is still the fastest produc-

tion Jaguar ["Effin' Loud," September 2016]. Jared Gall must have forgotten that when writing about the F-type SVR!

—Walter King Hickory, NC

A galling oversight—Ed.

CROSSING OVER

Allow me to add an option for us mere mortals who can't afford to drop \$50K on a daily driver ["The Hatchbacks of Haughty Claims," September 2016]: the Kia Sportage SX Turbo. The Koreans got it right with its attractive, sporty, and practical design. The seats aren't the most comfortable thrones you've ever sat in, and the ride can be a bit harsh, but I don't think many readers of this fine publication would gripe.

—Robert Kempf Atlanta, GA

Wanna bet?—Ed.

As I look through the September 2016 issue of *Car and Driver*, I can't help be a bit disappointed by the death of the station wagon, shooting brake, or touring. The proliferation of the so-called crossover is such a sad testimony of the

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Standings: 1. Romain Thievin, 383 pts 2. David Perisset, 211 pts 3. Bill Hynes, 208 pts 4. Lisa Clark 194 pts (Best Lady) 5. Roger Eagleton, 166 pts 6. Mark Ramsey, 140 pts 7. Hanna Zellers, 98 pts (Best Junior) T-8. Burt Jenner, 90 pts T-8. Sammy Valafar, 90 pts 10. Sheng Ping Yuan, 75 pts 11. Caitlyn Jenner, 70 pts T-12. Paul Morris, 67 pts T-12. Arie Luyendyk Jr, 67 pts T-14. Frederic Johais, 62 pts T-14. Michael Halverson, 62 pts T-16. Max Chen, 60 pts T-16. Scott Jennings, 60 pts...

RACING DRIVER FEATURE



Richard, an accomplished entrepreneur, started racing with us after his High Performance Driving Experience at Exotics Racing; he then joined the racing school. Under the instruction of pros Tristan Vautier and Alex Premat, Richard saw his lap times drop after every lap.

"Their knowledge and ability is unparalleled, and if you just listen to them, you'll drive like them." He has signed for the season. "If you are looking for a fun and thrilling racing experience, this is the series for you. It has certainly been perfect for me. This is a 1st class team of racing experts who work hard to make sure you have all you need to win. They set everything up perfectly, but it's up to me to get on podium which is half the fun."

- Richard McIntosh

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tastes of current drivers. While I certainly appreciate the appeal of a vehicle that can supposedly do it all—tow a boat, seat six or more, travel off-road—most of these new vehicles only appear to be so capable. The truth is that most drivers are using these things to drive to the mall, school, and grandma's house. A long roof and hatch on an established sedan is such a better choice. It drives better, is often more efficient, and, in my eyes, usually looks better.

—Clarence Curry
Williamsburg, VA

You missed one that a lot of us would like an answer to: Why can't someone make a car that looks as sharp on the outside as a more expensive model but at a price the average Joe can afford? Just the styling, not the fancy material or the fancy, and expensive, innards. I'm not even talking a Lamborghini—just a BMW or Audi or Lexus shell at the price of a moderately priced Chevy/Ford/Hyundai.

—Al Padeletti
Rochester, NY

Let me guess, you drive a Pontiac Fiero that looks like a Ferrari F40—Ed.

BOMB THROWER

Daniel Pund is way too old to be using "bombed" the same way twice in one article ["The Naked German," September 2016], even if the vehicle doing the bombing was a Porsche 911 R.

—Chris
Kalamazoo, MI

Pund doesn't think this letter is the bomb—Ed.

20/20

Maybe Michael Simcoe, the new chief of design at General Motors ["20 Questions for 2017," September 2016], will be able to order Cadillac to kill and destroy the "blend of art and science" design motif that has created some of the ugliest cars in the last 20 years.

—Tony Aterno
Austin, TX

SEDAN CHAIRS

Eddie Alterman failed to point out another key reason for the rise of SUVs and crossovers ["Editor's Letter," September 2016]. My 56-year-old body simply does not bend and stoop down easily these days. It's much easier to slide my ass into a taller vehicle.

—Denis M. Wolowiecki
Charlotte, NC

GUNPLAY

I loved the last paragraph of Phillips's September column ["Mr. Phillips has some questions"], but, uh, you're going to get some letters.

—Rob Herman
Grand Rapids, MI

The gun-control comment toward the end of Phillips's column on autonomous cars was way out of line. Can't there



Editor's Letter:

The National Highway Traffic Safety Administration just disgorged a 112-page paper prescribing some guidance for the care and feeding of automated vehicles. It's a real page-turner.

President Obama praised the effort in a recent Op-Ed in the *Pittsburgh Post-Gazette*, writing: "Automated vehicles have the potential to save tens of thousands of lives each year. And right now, for too many senior citizens and Americans with disabilities, driving isn't an option. Automated vehicles could change their lives. Safer, more accessible driving. Less congested, less polluted roads. That's what harnessing technology for good can look like." Um, more cars on the road means less congestion? Sure, you're the boss.



The NHTSA policy package has four parts: 1) Vehicle Performance Guidance, with its multipoint plan for how automated vehicles should be designed and how they should behave; 2) Model State Policy (the obligatory but perhaps necessary landgrab by the feds); 3) Current Regulatory Tools; and 4) New Tools and Authorities, i.e., more regulations, more land grabbing.

Bless those pointy-headed rulemakers in D.C., for they worked their little craniums sharp here. But I can alleviate all the grasping toward this slippery subject with one rule: Block drivers' texts and emails. Deploy the so-called lockout technology Apple patented in 2014, and the automated car—and its tortured policy—becomes unnecessary. As well it should be. We do not concede that the ship of self-determination has sailed.

Because let's be honest: The fevered rise of automated-car research is inextricably tied to the rise in distracted driving, both of which are enabled by high-speed data. And data is the operative word here. Instead of solving the distracted-driving problem by simply freezing driver cellphone activity within a moving car, the big data companies encouraged self-driving technology, sensing an opportunity to collect/deliver data from/to the occupants. The self-driving car is an inelegant solution to the problem of vehicle safety, but an elegant one to the issue of data mining. I think the automated car serves the data companies vastly better than it does the cause of safety. But then again, I watch *Ancient Aliens*.

And now for something completely different: Welcome Ray Evernham, whose guest column appears on page 038. Ray was the crew chief's crew chief, whose partnership with Jeff Gordon resulted in 47 NASCAR Cup wins and three Cup championships. He's a storyteller in the great Southern tradition, and we are proud to have him here.

—Eddie Alterman

be any media where we can get away from politics? Who cares what car journalists think about the Second Amendment or, for that matter, anything political in nature, not directly affecting automobiles? Certainly not me, but more important, we are inundated constantly by left-wing media constantly pounding home their ridiculous political opinions. I read car mags for pleasure and to get away from political propaganda. Gun-control matters have nothing whatsoever to do with cars. There are plenty of car mags out there. I like *Car and Driver*, evidenced by my years of subscriptions, but one more political opinion and I, for one, am out of here. I already subscribe to a number of print and digital monthly and biweekly car rags. One less I will not miss that much.

—Steve Shirik
Lawrenceville, GA

Kudos to John Phillips for the final paragraph of his column in the September 2016 issue, in which he contrasts the "engineering, intellect, dedication, and costly resources" being put into developing autonomous cars in an effort to cut down on highway deaths with the nation's apparent unwillingness to do the same in relation to gun deaths. He will doubt-

NEW PERSPECTIVE ON THE ROAD



BY REX HOWELL

Inky, pre-dawn skies promise empty highways. My favorite. And a welcome sight as I cruise out of Los Angeles, a city world famous for traffic. A type of traffic that's worthy of a Viking song. But today its roads stretch out before me and I couldn't be happier with my decision to skip the brake-light parade down Sunset. Instead I point my car east to the San Bernardino Mountains.

MY DESTINATION SITS NEAR THE TOP, IN BETWEEN THOSE PEAKS.

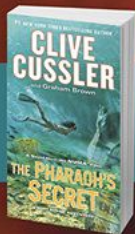
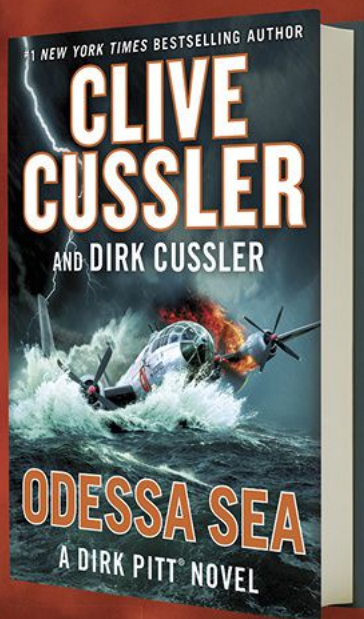
The miles melt away as red and gold streaks of light trumpet a sunrise that outlines the mountains. My destination sits near the top, in between those peaks. Lake Arrowhead and Big Bear Lake are ringed by proud old growth and ribbons of cement roads along their shores. To me a perfect getaway. A quick exit off the freeway puts me at the base of Highway 18 and its 5,000-foot climb into the mountains. My reverie is broken by a brief thought: what's going to cause traffic on Sunset today? A tumbleweed of plastic bags, perhaps? I grin and dive into the road ahead.

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less be excoriated by Second Amendment idolaters and the gun manufacturers' skill, Wayne LaPierre, but my guess is that there are plenty of others besides me who support his exposing this irony. Well done, John!

—William Heil
Petoskey, MI

I have been reading your publication for many years and predominantly enjoy it very much. A low mark, however, is frequently John Phillips's column. He seems to try overly hard to be humorous and sometimes succeeds, but the content rarely has anything significant to do with the automotive topics for which I read your magazine. He is clearly a left-wing liberal who can't resist the temptation to include his political opinions, even though they detract from whatever else he may be trying to accomplish. In the September 2016 issue, he made a comment about gun deaths in the last sentence of his column. I seriously doubt that he knows anything valid about this subject, and his intentionally negative comment on it merely serves to irritate your readers who legally use, collect, and enjoy firearms. I acknowledge his First Amendment rights to express his political prejudices, but I believe the venue of your publication is inappropriate.

—Lowell Little
Albuquerque, NM

Give the man a raise. John Phillips nails it on the questions surrounding autonomous cars, keeps you laughing through it all, then puts the whole notion in perspective with a thoughtful conclusion. Best writer in the business.

—Bruce Hines
Toronto, ON

Enjoyed Phillips's article (rant) right until the last paragraph. If judges, cops, and our elected officials would insist that the laws we have now are enforced, the death rate for guns, car wrecks, kids left in hot cars, and many others could be eliminated.

We need laws already on the books enforced. Not more redundant laws.

—Chuck Gordon
Cleveland, TN

As Thomas Jefferson said, "I prefer dangerous freedom over peaceful slavery." I'm hoping I'll be gone by the time the government forces us into no-drive modules for our own good.

—Bill Schiffmann
Lago Vista, TX

MORE NEW CARS

The review of the Volvo XC90 says of the engine that at higher revs there is "an anguished groan" ["Chariots of the Dads," March 2016]. Yet the review of the S90 in the September issue ["Call It a Comeback"] says you noticed "only the occasional hint of a four-cylinder drone." Same engine, same year, different evalua-

Letter of the Month:

Screw the four-cylinder S90. Volvo should drop the Dodge Challenger SRT Hellcat's 707-hp V-8 in the thing. They could call it the Polecat. I bet it would go like stink.

—Dave Lesack
Kelowna, BC

tors. Perhaps your evaluators should compare notes.

—Don Herman
Brevard, NC

Different car, different acoustic package—Ed.

Compliments to Volvo design for improving some great designs of the past. The S90 is reminiscent of the BMW 7-series from the mid-1990s, and the V90 is a modern

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NEW PERSPECTIVE

ON THE 2017 CHEVROLET CRUZE

The road to Lake Arrowhead climbs the weathered mountainside, each turn alternating between chiseled rock face and vast views of southern California. The 2017 Chevy Cruze and its sculpted, aerodynamic design stand out in contrast to the few other autos sharing the road with me. Its bold styling confidently assures me it won't go unnoticed on this adventure.

Near the top, Highway 18 becomes the historic Rim of the World Highway. I pull over into a turnout and marvel at staggering views that convince me this road is worthy of that name. I take a photo and wonder how the great photojournalists would feel about camera phones before questioning how this much nature can be so close to America's second largest metropolitan area. The pull of the asphalt is strong and thanks to keyless entry, the Cruze and I are safely back on the road, hugging its curves in no time.

The standard 1.4L turbo engine propels the car from 0-60 in 7.6 seconds.¹ More than enough thrust for the Cruze to take

INSIDE, THE CAR'S
SILENT RIDE ALLOWS
ME TO ADMIRE THE
TWISTS AND TURNS
FLANKED BY PINE.

on these roads while sipping gas with 40 MPG highway. Inside, the car's quiet ride allows me to admire the turns flanked by pine.

I round the final corner and Lake Arrowhead reveals itself, gleaming blue along the road in front of me. I realize that this moment demands a soundtrack. The Cruze is there to help, connecting to my music through support for either Apple CarPlay and Android Auto.² The Chevrolet MyLink 7-inch diagonal color touch screen billboards the next song on my mountain-drive playlist as I crank the volume with the car's steering wheel controls. I won't miss a beat or a twist in this road.

¹EPA-estimated MPG highway for Cruze LS/LT with 1.4L 4-cylinder engine and 6-speed automatic transmission. ²Vehicle user interfaces are products of Apple and Google and their terms and privacy statements apply. Requires compatible smartphone, and data plan rates apply.



update of the Dodge Magnum. These are the best-looking Volvos in decades.
—Scott Powell
Meredith, NH

NICE GUY

You know, that column by Aaron Robinson in the September 2016 issue, that was just plain nice ["Cars are rocks in the river . . . or something"]!
—Anthony Loades
Winnipeg, MB

To echo what another reader so astutely pointed out, whatever you're paying Aaron Robinson, it's not nearly enough. While reading his column in the September issue, my eyes started to well up with tears. And not just because I could relate to the way certain cars can transport us back to a specific point in time. The subtly poetic prose painted a poignant reminder of our place in the vast universe. It's a remarkable feat for a column to strike such an emotional chord. Better yet, I then turned the page to read Ezra Dyer's latest rant, and I laughed so hard that my tears of sadness became tears of joy. On second thought, give both of them raises.

—Evan Rondeau
Madison Heights, MI

ALFA BITS

Mr. Dyer's column on the 4C ["Advocacy for the Alfa Romeo 4C from the man behind the kazoo craze," September 2016] makes many great points as to the wonderful looks,

driving experience, and relative value of the Alfa. From my perspective, however, one component of the formula is missing. It needs a manual transmission. All the objective arguments in favor of modern automatics are true, but a car like the Alfa cries for a manual.

—John O'Neill
Silverthorne, CO

Okay, Ezra, you have done it again. You made me smile, laugh, and think all at the same time when you said of the Alfa Romeo 4C, "The wheel is so sensitive, a beautiful sunset makes it cry."

Well done!
—Tom Orashan
San Antonio, TX

WHAT ABOUT BOB?

Phillips's Bob Lutz interview was fascinating ["What I'd Do Differently," September 2016]. Normally the last page is kind of a throwaway, but you could've done several more pages on Lutz and I would've been thrilled. Unfiltered as only an 84-year-old can be, his takes on Lincoln and Dieselgate were particularly damning.

But what intrigued me most was his contention that the auto industry as we know it only has another 20 years. I certainly hope he is wrong, but if he's not, I need to do some shopping right now!

—Jim Griffin
Manassas, VA

Wish your interview with Bob Lutz was 10 pages longer. His

direct, candid, thoughtful, and experience-drenched replies seem all too rare these days. I realize he's a bit overqualified based on the litmus set by the present candidates, but might C/D be willing to stage and draft him into a presidential write-in campaign?

—Tim McCabe
South Abington Township, PA

Regarding the Bob Lutz interview, and those that have come before: I truly believe "What I'd Do Differently" to be among the best pieces of regular journalism in America today. I hope this doesn't cause you any trouble, since so many people hate journalists.

—Sean Finnell
Washington, D.C.

SPIDER MAN

I really like the spider graphs. They make overall comparisons easier to assess.

—Matt
Fresno, CA

I really hope this isn't sarcasm—Ed. ■

“... YOU COULD’VE DONE SEVERAL MORE PAGES ON LUTZ AND I WOULD’VE BEEN THRILLED. UNFILTERED AS ONLY AN 84-YEAR-OLD CAN BE, HIS TAKES ON LINCOLN AND DIESELGATE WERE PARTICULARLY DAMNING.”

—Tim Mikel
Ventura, CA

Explained:

Would MPGe and carbon emissions be different if you charged an electric car using solar panels rather than the grid?

MPGe is determined by the number of miles driven against the amount of onboard electricity consumed. It's useful for comparing an electric vehicle's energy efficiency relative to another EV's or to that of a gas or diesel car and is calculated using a conversion factor that accounts for the fact that, by EPA decree, one gallon of gasoline contains 33.7 kWh of energy [see below]. The amount of energy used is unrelated to the source of the electricity, so MPGe doesn't change if you use solar panels.

The carbon-dioxide emissions of an EV, however, do vary with the source of the electricity that goes into the battery. In a state like West Virginia, which gets 94 percent of its electricity from coal-fueled powerplants, an EV is essentially a coal-powered car. But charge your EV in California, a state with a high percentage of electricity generated from renewable resources such as wind, solar, and hydro, and its carbon-dioxide emissions shrink dramatically—Ed.

An EV's MPGe can be calculated using this equation:

$$\frac{(\text{miles driven} \times 33.7)}{\text{kWh of electricity used}} = \text{MPGe}$$



THE FULL PERSPECTIVE

CLOSE-UP ON THE 2017 CHEVY CRUZE



No rule says compact cars need to sacrifice style or features. Trust me, I looked. But if there were such a rule, the 2017 Chevy Cruze would refuse to obey. With bold styling and high-tech options you'd expect to find on luxury models, this car refuses to compromise.

The aerodynamic design cuts through the crowd, the undeniably sporty shape starting its own conversation. From the front, available projector-beam headlamps with signature LED daytime running make for a great set of eyes. Sculpted lines lend depth to the striking Kinetic Blue Metallic paint.

WITH BOLD STYLING AND HIGH-TECH OPTIONS YOU'D EXPECT TO FIND ON LUXURY MODELS, THIS CAR REFUSES TO COMPROMISE.

Keyless entry means never pulling on a locked door handle again. Inside, turn up the heated seats—available front and rear—and optional heated steering wheel. Power windows and an optional sunroof all adjust to your liking with a single touch. The 60/40 split-folding rear seats encourage you to bring your gear with you.

Hit the road with the hustle of a 1.4L turbocharged engine, and stay on it longer with an efficient EPA-estimated 40 MPG highway, or 39 MPG highway offered by the Cruze Premier. That's a potential of up to 530 highway miles of range for you to take in the peace and quiet, thanks to a specially designed, acoustically laminated front windshield.

That quiet will come in handy when duty—in the form of your home or office—calls, as will the standard Chevrolet MyLink's 7-inch diagonal color touch screen. Its available advanced phone integration and available built-in 4G LTE wireless hotspot will keep you in the loop while you're out exploring.¹ Don't forget to stay charged up by plugging your laptop or mobile device into the available 110-volt power outlet. Connect your mobile device to the Cruze with Android Auto™ or Apple CarPlay² and use intuitive pinch-to-zoom controls or voice commands to interact with maps, text or call your contacts, or play your favorite music.

¹Requires a compatible mobile device, active OnStar service and data plan. 4G LTE service available in select markets. Visit onstar.com for coverage map, details and system limitations. ²Vehicle user interfaces are products of Apple and Google, and their terms and privacy statements apply. Requires compatible smartphone, and data plan rates apply.

For more information visit chevrolet.com/cruze.

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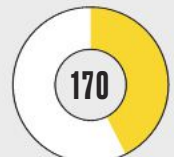


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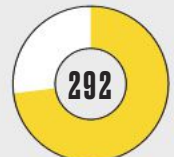
Upfront



HORSEPOWER COMPARED



Audi A3 1.8T



Audi S3



Audi RS3

Reveal of the Month

RS KICKER

MEET THE NEWEST OF AUDI'S GNARLIEST, THE 400-HP RS3.

by Mike Duff

AUDI OFTEN DENIES THE U.S. its juiciest fruit, especially when it comes to high-performance RS models. We were adjudged worthy of the RS4 sedan, RS5 coupe, and RS7 coupe-sedan, but not of the RS4 and RS6 wagons or the RS3.

Until now. While the RS3 hatch ("Sportback" in Audi-ese) will remain in Europe, the sedan arrives as redress for these denials. This is an RS that's been designed for our side of the Atlantic, and Audi figures 40 percent of total model sales will happen

in North America. As apologies go, a 400-hp five-cylinder compact sedan certainly beats a muffin basket.

▼ CHASSIS

When the official history of Volkswagen's MQB compact architecture is finally written, it will top the best-seller lists in Germany. And the RS3 and the mechanically similar TT RS will likely go down in history as the most powerful cars ever to be spun from this extremely flexible platform.

Each has nearly five times the 85-hp output of the most basic European-spec Golf, a remarkable stretch.

The RS3 is—and we mean this in the nicest possible way—exactly the sort of stitched-together Frankenstein's monster that



001

001
RED ACCENT STITCHING ARGUABLY ADDS MORE EXCITEMENT TO THE INTERIOR THAN THE NEW FRONT AND REAR FASCIAS DO TO THE BODY.



002

002
THE WORD QUATTRO ALONG THE BOTTOM OF THE GRILLE SURROUND IS LIFTED FROM THE RS7. EXPECT IT TO BE ADDED TO THE PORTFOLIO OF SIGNATURE RS STYLING CUES.

such adaptable underpinnings encourage. It's essentially the TT RS's five-cylinder engine packed into the existing A3 body shell. "If you were to drive it against a TT RS on a racetrack, then the TT would be the winner—but it would be close," says Audi Sport development boss Stephan Reil, "and [the RS3] has a trunk and room for four people. It's an outstanding compromise."

▼ POWERTRAIN

Audi's profitability and growing sales have made it a favored child within the Volkswagen Group, indulged in a way that must make its plainer sisters, the Euro-market Seat and Škoda, deeply envious. That's why it's been allowed to develop a new, all-aluminum version of its five-cylinder turbocharged engine, despite the mill's limited use in the RS3, TTS RS, and—we're presuming here—the next-generation RS Q3.

The new one shares the 2.5-liter displacement of the old iron-block unit, but Audi reports that it's 57 pounds lighter. The significance of that savings is amplified by the engine's position forward of the front-axle line. A revised cylinder head and an increase in boost pressure bring more power, the RS3 giving 400 horses, a 33-hp increase over the old five.

Reil admits it would have been possible to generate a similar output from a version of the familiar 2.0-liter turbo inline-four engine. Indeed, Volkswagen was working on such a unit, previewed by the Golf R400 and Audi TT Quattro Sport concepts back in 2014. But Audi's exceptionalism won the



003

003
AUDI CLAIMS A 4.1-SECOND ZERO-TO-60 TIME FOR THE RS3, BUT WE FIGURE ALL-WHEEL DRIVE AND 400 HORSEPOWER WILL LAND IT IN THE 3s.

"THERE ARE SO MANY HIGH-PERFORMANCE FOUR-CYLINDER ENGINES, BUT THE FIVE-CYLINDER HAS ALWAYS BEEN AUDI'S UNIQUE SELLING PROPOSITION."

— STEPHAN REIL,
AUDI SPORT
DEVELOPMENT BOSS



day, and development on that engine has been canceled.

“There are so many high-performance four-cylinder engines, but the five-cylinder has always been Audi’s unique selling proposition,” Reil explains. “And of course there’s the sound,” he adds. “Nothing sounds like a five-cylinder turbo, and our customers love that.”

The hefty output reaches the road through a seven-speed S tronic dual-clutch transmission and an all-wheel-drive system that uses a hydraulically controlled clutch pack to divert torque to the front wheels when required—though Audi won’t disclose the precise split of which the system is capable. Under normal conditions, around 80 percent of output heads rearward.

▼ STYLING

Audi stuck to the “make it an RS” playbook for the cosmetic upgrades. At the front, there is a deeper bumper with additional air intakes and the word quattro in letters along the bottom of the grille surround. RS3-only 19-inch aluminum wheels are standard. The rear features two tailpipes big enough for a commuter train to pass through, a lip spoiler on the trunklid, and a diffuser that Reil assures us does indeed reduce lift at speed. The cabin builds on that of the S3, with a generous smattering of those all-important RS logos, as well as mul-

004

If you said the RS3 looked a little reserved, we wouldn’t disagree. But the LMS is thrilling proof that the Germans get race-car design.

tiple skeins’ worth of red stitching on the sport seats and the chunky steering wheel.

▼ HOUSEKEEPING

U.S. deliveries of the RS3 will commence next summer. Prices haven’t been confirmed, but RS models traditionally carry a sizable premium over their S sisters. This is a compact Audi that’s certain to open north of \$50,000. Unless you’re talking about the chewing gum, juicy fruit tends to be expensive. And worth it.



004

LE MANS STUNNER

Despite Audi’s commitment to five-cylinder engines, there will be a version of the RS3 with only four plug leads. The RS3 LMS is a compellingly mean-looking thing, complete with dramatic arch extensions and a wing that a Japanese custom shop would regard as excessive. But tighter regulations in the European TCR touring-car series, in which it’s built to compete, mean that the LMS has to make do with a 2.0-liter turbo four. With 326 horsepower, it’s likely to be a little slower in a straight line than the production car. But we’re betting it will be a lot quicker in corners.



A MIGHTY WIND

OR: IN DEFENSE OF THE REAR-WINDOW LOCKOUT BUTTON. *by John Pearley Huffman*

■ IT CAN BE AS LOUD as standing alongside a Boeing 767 at takeoff. And it's about as irritating as having someone thumping on a bass drum in the back seat. Whether you call it wind throb or buffeting or just plain annoying, it happens when someone in the car opens a single window at speed and it stops when a second window rolls down.

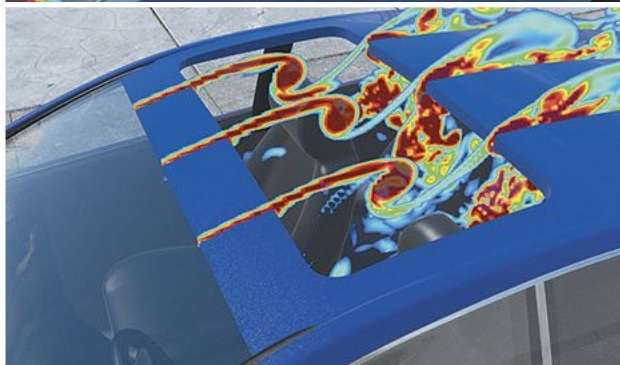
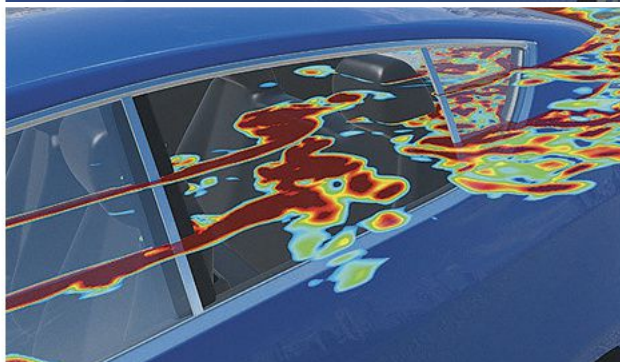
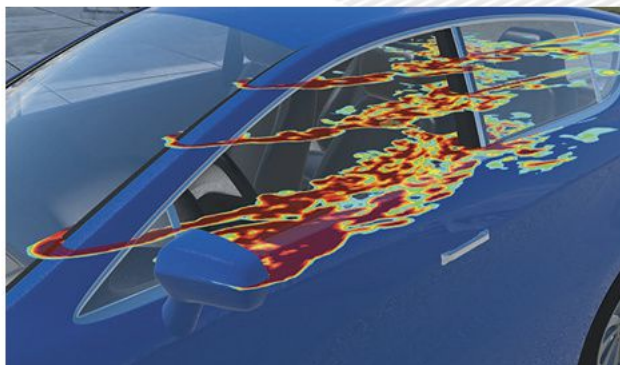
The phenomenon that produces this noise is the Helmholtz Resonance, the same principle that makes a bottle hum when you blow over its open top. It's the interaction of the gas in a container with a single orifice and the other gases that are, um, passing over that orifice. In this case, the container is the car. The interaction between the two masses of air produces vortexes that compress and decompress the air, producing the throbbing effect. Hermann von Helmholtz, the German physician and physicist who described this interaction, died in 1894 and was thus unavailable for comment.

How intrusive buffeting can get depends on the car's shape and the size of its windows as well as the speed the vehicle is traveling. Modern cars and trucks are more subject to air thump because they're so aerodynamically efficient and well sealed against wind intrusion. Jim Zunich, GM's global vehicle performance chief engineer for wind noise, explains: "We want nice, smooth attached air for aerodynamics, but that's worse for buffeting."

When the car was designed with little concern for aero, the haphazard mass of air boiling around it only coincidentally adhered to

GIMME BUFFET

SEE THE TOP IMAGE FOR HOW THE SIDE-MIRROR SHAPE CAN AFFECT AIR MOVEMENT AROUND THE FRONT WINDOWS, AND THE MIDDLE IMAGE FOR HOW NOT MUCH CAN INFLUENCE FLOW AROUND THE REARS. A POP-UP DEFLECTOR WOULD SHIFT AIRFLOW OVER THE OPEN SUNROOF REARWARD, MITIGATING THOSE ANNOYING VORTEXES.



the vehicle's surface and only occasionally allowed the Helmholtz Resonance to generate its vortexes. And even when the problem did arise, the car's other windows and doors were hardly airtight, so the air leakage around them relieved any pressure differences. But a modern cockpit is a well-sealed drum from which only minimal air pressure leaks. In this small, particular way, a modern vehicle is too good for its own good.

But why is buffeting so much worse when just a rear window is down? Two words: side mirrors. They're one of the last things developed in a vehicle's design, and they're placed and shaped precisely to direct airflow in a way that minimizes buffeting at the front windows. But there are no easy tweaks to be made to tune the airflow around the rear windows.

Buffeting is likely to get worse as vehicles get more aerodynamic. "Obviously, if we could resolve it free of charge, it's something we would do," concludes Zunich. "But because it comes with styling, aero, and noise penalties, it's a trade-off engineers have to make." Well, whether or not we understand how buffeting works, most of us have figured out a solution: Crack another window.



POWERING UP

Software supplier Exa developed PowerFLOW, the simulation software that generated the images on this page. PowerFLOW is a computational fluid dynamics (CFD) program. CFD generates a detailed mathematical model of a fluid flow, in this case allowing engineers to observe and tweak how air flows over, around, and through a car on a molecular level. It's just one of the tools that allows automakers to design a complete car before a single part is stamped or cast. Suck on that, Instagram. —Jared Gall

What owners say about V1...



★★★★★ Bill P., Phoenix, AZ

Where's the radar? An arrow lights up, pointing either Ahead, to the side, or Behind. And, amazingly, it's never wrong.



★★★★★ Arnie R., Atlanta, GA

So easy to operate, a box with one knob. No need to poke around at full-arm's reach for little buttons the size of rice grains.



★★★★★ Glenna R., Dallas, TX

Love the arrows! Where's the radar? They tell me every time. A detector without the arrows is like a car without headlights.



★★★★★ Chas S., Charlotte, NC

Situation Awareness you can trust. With the Radar Locator arrowing toward threats, and the Bogey Counter telling how many threats you face, V1 makes defense easy.



★★★★★ Cal L., Trenton, NJ

I've owned my V1 since 2001, and I've had it upgraded twice. I trust the arrows to point out every radar trap. When I know *where*, I know how to defend.



★★★★★ Ed H., Las Vegas, NV

How can anyone not be smitten by the Arrows? Radar ahead needs a different defense than radar behind. When I know where, I know what to do. When I put the threat behind me, the arrows confirm it. Without the arrows, you're guessing.



★★★★★ Rob R., Sacramento, CA

This is the slam dunk best radar detector. No databases to keep updating, or other "features" I'll never use. Instead V1 tells me the important stuff—the Bogey Counter tells you how many threats within range and the red arrows tell where they are.

Trust...V1 earns it one ambush at a time.



★★★★★ Harold B., Houston, TX

On my way home this afternoon I was following another detector user. I could see red blinking in his windshield as we went past the first radar. Thinking the danger was behind, Mr. Ordinary Detector User hit the gas.

Uh-Oh. V1's Radar Locator was showing two arrows, one pointing toward the trap now behind, and a second arrow ahead. The "2" on the **Bogey Counter** confirmed we were being double teamed.

Sure enough, Mr. O. D. User cruised into the second trap up the hill at 15 over and got himself a blue-light special.

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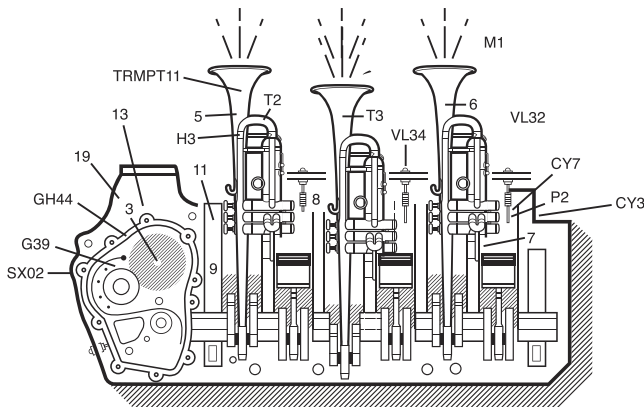
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PATENTLY ABSURD?

HERE ARE SOME OF THE INNOVATIONS HITTING THE U.S. PATENT OFFICE'S INBOX. *by Benjamin Preston*

AN INTERNAL-COMBUSTION ENGINE is still a metal box of pistons that slap up and down (or side to side). But improvements through the years have transformed cars from the retrospectively simple devices of the Tin Lizzie era into complicated, computer-regulated tech labs. Infiniti is soon to deploy the latest major internal-combustion innovation, the variable-compression-ratio engine we covered last month. And the breakthroughs continue, as there are still plenty of improvements to be made to today's automobiles before we begin beaming ourselves across the universe with our Roddenberry guns. Here are three inventions currently in the works, as deduced from reviews of recent patent grants by the U.S. Patent and Trademark Office:



The Keytar

COMPANY: Ford

USPTO NAME: Increasing the number of cylinders in an internal-combustion engine in a virtual fashion

WHAT IT'LL DO: Artificially generating the sound of extra power strokes in between the real cylinder firings of a downsized engine will make it sound as if it has more cylinders than it does. Ford has found that many drivers in cars with downsized engines and manual transmissions rev those engines higher when shifting by ear, partially negating their fuel savings. The idea here is to trick them into shifting earlier by superimposing the sound of extra cylinders via an electronic noisemaker.

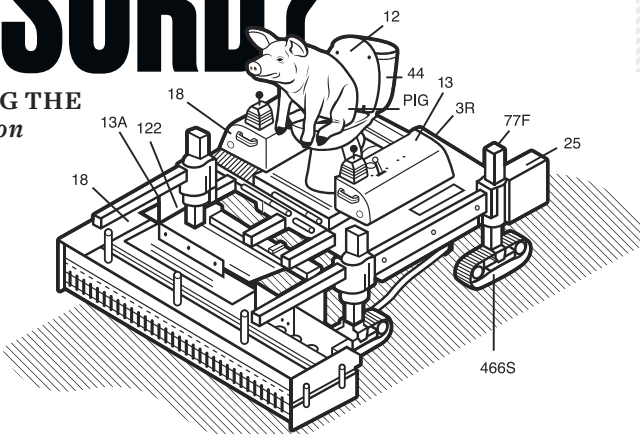
REALITY CHECK: Ford already uses speaker-based engine-sound enhancement in some EcoBoost

engines; this is a pretty straightforward extension. It was developed by a German engineer, presumably for European drivers who are much more likely to have manual transmissions than are American motorists. But it'd be a simple thing to add no matter where a model is sold.

STATUS: Filed January 15, 2014; patented May 3, 2016

DON'T FLIP YOUR LID

When Ford brought out the capless fuel filler in the 2005 Ford GT, it seemed like an inconsequential gimmick. But the capless filler is the next great we-have-to-have-it-because-they-have-it feature, now offered by 14 different brands. Anecdotal evidence suggests most people spend the time saved by not removing a cap staring at their phones without actually opening any apps.



Porky's II

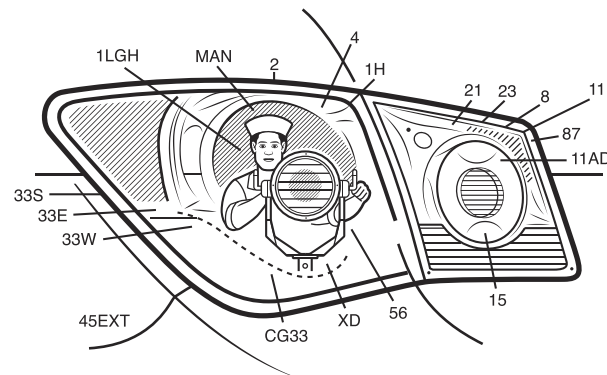
COMPANY: Bio-Adhesive Alliance

USPTO NAME: Preparation and uses of bio-adhesives

WHAT IT'LL DO: Pig manure is rich in oils similar to the low-grade petroleum used to make asphalt. Subbing these oils for petroleum distillates yields a hardy road surface that is also renewable. Not only that, but poovement—that's ours, don't try to trademark

it—would help areas that rely heavily on hog farming deal with problematic volumes of waste. **REALITY CHECK:** Scientists at North Carolina Agricultural and Technical State University are conducting durability testing, the early stages of which have been promising. Don't worry; the smell goes away in processing.

STATUS: International patent filed September 20, 2013



COMPANY: Shanghai Koito Automotive Lamp

USPTO NAME: Automobile lamp device and method for transmitting signals through light thereof

WHAT IT'LL DO: Cars would be outfitted with light-emitting devices in their taillights and receiving modules in their headlights, allowing vehicles to communicate with those immediately behind them. The light signals function as a kind of modern Morse code. As a bonus, the inventor claims light transmission provides a more accurate under-

standing of surrounding traffic than existing camera- and radar-based active-safety systems.

REALITY CHECK: V2V communications will pile a tremendous amount of additional functionality into existing computing systems, and this narrowly focused method would enable a car to communicate only with the vehicles within sight. We expect the collision-warning role of this invention to be bundled into other systems, though this could function as a fail-safe redundancy layer.

STATUS: International patent filed December 18, 2013

Helping you feel safe in your lane.

The 2017 Toyota Corolla's standard **Toyota Safety Sense™ P (TSS-P)**¹ is designed to help keep passengers safe with a suite of systems including Lane Departure Alert with Steering Assist.² This feature is designed to detect visible lane markers on the road, alert the driver if an inadvertent lane departure is detected and may also provide slight, corrective steering inputs to help keep the vehicle in its lane. With TSS-P's Lane Departure Alert, you'll feel greater peace of mind on the road.

The New 2017
COROLLA
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Prototype shown with options. Production model may vary. 1. Drivers should always be responsible for their own safe driving. Please always pay attention to your surroundings and drive safely. Depending on the conditions of roads, vehicles, weather, etc., the system(s) may not work as intended. See *Owner's Manual* for details. 2. Lane Departure Alert with Steering Assist is designed to read lane markers under certain conditions. It provides a visual and audible alert and slight steering force when lane departure is detected. It is not a collision-avoidance system or a substitute for safe and attentive driving. Effectiveness depends on many factors. See *Owner's Manual* for details. ©2016 Toyota Motor Sales, U.S.A., Inc.



Let's
Go
Places



Crash-Bang Boom

AXLES TO GRIND

ALARMS ARE SOUNDING OVER HEAVY-TRUCK CRASHES. WHAT'S GOING ON? *by Clifford Atiyeh*

AN INESCAPABLE COLLISION with a large truck is a driver's worst nightmare. On August 25 in Binghamton, New York, a semi hauling a load of stone plowed through 10 cars stuck in construction traffic. One car burst into flames, and an SUV was so compacted that the semi's front license plate was mashed into the back of the driver's headrest. Luckily, onlookers pulled the driver from the flaming vehicle, there were no back-seat passengers in the crushed SUV, and no one in the incident died or suffered life-threatening injuries. It was just another in a recent uptick in truck crashes that is sounding alarms around the country. But pending legislation that threatens to undermine decades of progress could be what really reverses us into deadlier territory.

Trucks were involved in 411,000 crashes in 2014, almost double that of 2010 when injury and fatality rates began rising, according to the latest data from the Federal Motor Carrier Safety Administration (FMCSA). In 2014, 3903 people (including cyclists and pedestrians) died in trucking accidents, a 6-percent increase over 2010. Truck-occupant deaths have jumped 24 percent, and injuries in trucking accidents have soared 39 percent. These figures are misleading, though. The recession slowed trucking, with crash statistics enjoying a proportional

depression. The widely reported increase in crashes and fatalities roughly paces the industry's recovery in recent years, realigning recent data with the long-term trend lines. The greater threat to those trend lines comes from proposed regulatory changes.

Driver fatigue is often underreported in truck crashes, but as with airline pilots and doctors, proper rest is critical for the job. In a joint study between the Canadian transport ministry and FMCSA, drivers and trucking-company reps who've been trained to recognize sleep disorders and to combat the onset of fatigue reported longer sleep cycles and fewer accidents. Incidents of nodding off, as well as other near-crash scenarios, were reduced by 40 percent. The FMCSA reported that nearly all drivers involved in fatal crashes during 2013 who were officially classified as fatigued

SLOW IT DOWN

Last summer, the National Highway Traffic Safety Administration (NHTSA) and FMCSA introduced a proposal that would fit all new heavy trucks and buses with governors. The agencies claim that limiting heavy-truck speeds could save as many as 500 lives annually. And it's not only a safety measure, as lower speeds

generally correspond to increased fuel economy. Regulators claim the initiative could save up to \$1 billion in fuel per year. The motion has significant support from the trucking industry. Indeed, the American Trucking Association has been petitioning the government to enact such a rule for years, though it has also suggested that the limit for all traffic be set to the same speed as trucks' limiters. That part we're less excited about. —Jared Gall

had exceeded federal hour limits or had failed to log their time behind the wheel.

Currently, truck drivers can legally drive for 60 hours over seven days, or 70 hours over eight days, with a mandatory 34-hour rest period before restarting. Trucking companies successfully lobbied for the suspension of a 2013 ruling for two consecutive rest periods between 1 a.m. and 5 a.m., but another amendment to a transportation bill in December 2014 would have stretched a driver's on-duty time to 82 hours in one week. That amendment was cut, but the bill now permits 73 hours in seven days—13 hours more than the current limit—if the FMCSA can't prove that the consecutive rest periods improve driver safety. FMCSA recently completed a five-month study and submitted its findings to the Department of Transportation, but there is no timeline on the DOT's decision. The American Trucking Association (ATA), the country's largest truck lobby, thinks those nighttime rest periods make motorists less safe. Forcing drivers off the roads in the early overnight hours, it says, makes them more prone to crashes when surrounded by morning rush-hour traffic. "We do not necessarily advocate more hours, just the flexibility to use those hours efficiently," says ATA spokesman Sean McNally.

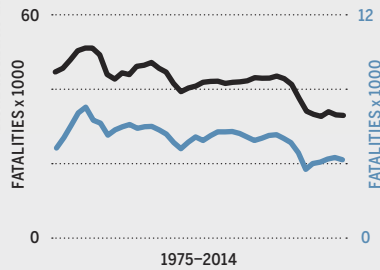
But the nation's 1.5 million truck carriers face ever-thinning profit margins and revenues that now run nearly 60 percent behind inflation. The phrase "if you're not turning, you're not earning" is a hard reality for many truckers who don't get paid if they're not accumulating miles, and they already have to deal with traffic, weather, loading, inspections, and maintenance.

"Sometimes it does get down to that last mile; their pay is impacted," says Patrice Vincent, manager of federal affairs for AAA. "Anyone who gets behind the wheel of any vehicle needs to have enough sleep. Safety needs to be considered over any economic factors."

There is more than just some shut-eye being deliberated. Other pending legislation would raise the maximum gross vehicle weight on interstate highways from 80,000 to 91,000 pounds (it's already legal for logging trucks to weigh up to 99,000 pounds in Minnesota) and increase the maximum length for semitrailers towed in tandem from 28 feet to 33 feet. Another provision would have lowered the minimum age for an interstate commercial driver's license from 21 to 18, although the final law restricted those youngsters to active military and veterans.

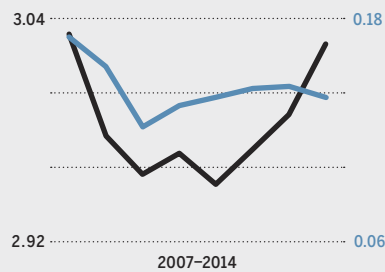
Yet another pending bill wants the FMCSA to block all trucking safety records

BACK ON TRACK



• All road fatalities • Truck-related fatalities

Fatality rates due to large-truck crashes have been in decline for decades. The increase over the last several years represents more of a course correction than a major shift in the trend.



• Trillion VMT • Fatalities per 100 million VMT

In 2007, the Federal Highway Administration changed its methodology for estimating the total miles traveled by all vehicles annually (Vehicle Miles Traveled, or VMT), complicating analysis of long-term trends. But as American travel habits have climbed out of the recession, the rate of fatalities attributed to large-truck crashes has increased only slightly, even declining for 2014, the last year for which data is available.

from the public for at least two years and permanently prevent courts from admitting them as evidence in civil trials. The FMCSA itself is proposing to erase "non-preventable" crashes (accidents where the truck driver is proved not at fault, such as a car cutting into a lane or a drunk driver hitting the truck) from these safety records and raise the threshold at which these accidents start to hurt trucking-company crash scores, which currently aren't public. And trucks aren't required to have stability control or any of the other driver aids so prevalent in today's cars.

Due to skill, regulations, and enforcement, commercial-truck drivers have far better safety records than the average driver of a passenger vehicle. But the stakes climb with vehicle weight; and speed limiters, higher insurance limits, testing for drug use, and mandatory driver assists such as blind-spot monitoring are all under legislative review, and in some cases, are supported by the trucking industry.

The FMCSA wants to catch faulty trucks by using infrared scanners that can recognize when tires, axles, and brakes are close to failure. When all trucks install electronic logging devices by the end of 2019—opposed by some over legitimate concerns of location tracking—it may lead to remote inspections where vehicle vitals and driver hours can be checked without stopping.

Modern truckers have to work even harder these days for their living, and safety costs money. But when it comes down to cars versus 18-wheelers, the cars need all the advantages they can get.



I've bought and sold plenty of cars in my life. Well, not a staggering number, really, but 35 or so. What *is* staggering is that I've never sold one at a profit. Never. I think I become too fixated on the next car I've lined up, and I screw the pooch.

Not just the pooch but also a pack of gray wolves hiding behind the pooch.

So, earlier this year, it was a shocker to get a letter from Lithia Toyota, in Missoula, Montana, in which it offered to buy my 2011 Toyota FJ Cruiser for what I paid for it 18 months earlier. “Do it,” I told my wife, “and you’ll have driven a car 18 months for free.”

She loves the funky FJ and declined.

It turns out that, from roughly the start of the year, the FJ Cruiser has been commanding the highest resale value of any non-collectible car on the market. Some were selling for 90 percent of their original sticker prices. I think it’s partly because the FJ is among the last of the body-on-frame SUVs; partly because it looks like a Jeep that a pufferfish designed; partly because it’s halfway rare now that Toyota has ceased production after selling roughly 20,000 per year in the FJ’s one generation from 2007 to 2014. So, finally, after 49 years, I could have made money on a car. Ha. That’s like saying, “I could make \$200 buying a dishwasher priced \$200 off.”



Of all the cars my father owned—at least 60, many collectible—he made money on the sale of only one. And that was a 1941 Cadillac Series 62 convertible that I picked up for him from a collector in Iowa. He later said he turned a \$5000 profit on the Iowa Caddy, not quite enough to pay for a month’s worth of Donald Trump’s embossed toilet paper.

In fact, here’s a clearer indication of our resale failures. My dad gave me a ’60s-era Volkswagen Beetle that served for more than 200,000 miles, at which point I upgraded to a Toyota Corolla. At the salesman’s desk, my father asked about the trade-in value of the VW. The salesman sighed, then wrote a number on a piece of paper, which he folded in half and slid across the table. My father opened it, remained silent, then handed it to me. The note said, “\$33.53.”

“Don’t get mad,” the salesman said. “Not mad,” my dad replied, “as long as you tell me how you came up with the 53 cents.”

At the opposite end of the buy/sell spectrum is Florida’s Swap Shop impresario, Preston Henn, 85, a former outright winner at the Daytona 24 Hours and Sebring 12 Hours. For the past 50 years, Preston has collected Ferraris—too many to list, but among them an Enzo, an FXX, a 275 GTB/C Speciale (probably worth more than all his other Ferraris combined), and a LaFerrari. That last car is notable, because last July

Henn attempted to buy a LaFerrari Spider (the Aperta). I guess you have to have the matched set. To ensure his place in line, Henn sent a letter to Ferrari CEO Sergio Marchionne, along with a \$1 million down-payment check written out to Marchionne personally. Did he think Mr. M. was a salesman? Maranello’s Enrico Galliera immediately returned the check with a note explaining that all the open-top LaFerraris had been sold, no more, kaput, end of story.

But not for Henn. Henn claimed that Ferrari of North America’s “agents and employees” at some point said he was “not qualified to purchase a LaFerrari Spider.” Uh oh. The man blustered and bloviated himself into a big itchy hedgehog of litigation, suing Ferrari of North America “for reputational injury and the mortification caused by declaring him to be not qualified.” He demanded a jury trial and claimed damages of at least \$75,000, about what he and Ferrari N.A. could conceivably spend annually on Christmas ornaments. Henn’s lawyer further scolded Ferrari, warning, “What a shame to shun him now.”

So, two things. First, Henn hasn’t experienced mortification—the metallic taste of the real thing—until he has waited in line at People’s Market, trying to buy four bottles of Clos du Bois chardonnay, only to have his Visa card denied. Second, I stared for 10 minutes at the copy of Henn’s \$1 million check—I’d never seen one before—wondering if his fingers cramped while signing it, and also wondering how long Marchionne toyed with the notion of cashing it. (Marchionne’s brain: “Seriously, how much trouble could I get into?”) All of which demonstrates why I—who would have cashed the check to buy my Clos du Bois and a Porsche 911 GT3 RS—am not anywhere listed in the phonebook serving The Greater Ferrari Cosmos.

And just as I’d fully inflated my own hydrogen-filled blimp of righteous indignation, Henn voluntarily dropped the suit. So, there you go. Happy days are here again.

Still, I think the moral here, as often uttered by my trial-lawyer father, is, “We are judged by the size of our complaints.” ■



OH, SURE, HENN’S 275 GTB/C SPECIALE IS RARE, BUT IT’S NO LAFERRARI APERTA.

John Phillips

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Taking the chipped prop off my Cessna 150 was as simple as taking a wheel off a car. Cut some safety wire and zip out the six AN6 bolts. In five minutes my majestic flea went from being a perfectly usable aircraft to a completely inert heap

of 47-year-old aluminum and streaky Plexiglas. However, putting a propeller back on a plane, I learned, is not nearly so simple. For six weeks, the 150 did nothing but make long hangar shadows.

Thus was I foiled in my romantic plan to fly from Los Angeles to the annual Monterey automotive glitz-a-thon. Indeed, I was so downcast about not being able to fly to either Pebble Beach or to the Bonneville salt races the week before—where I had planned to land at Wendover Field, the same historic Utah strip where the crews of the *Enola Gay* and *Bockscar* trained for their war-ending A-bomb drops—that I decided to crap out of Pebble Beach altogether and sit at home sulking.

Hence, I had exactly no reservations and nothing planned on the Friday of Monterey when I suddenly changed my mind (curse you, Facebook!) and decided to make the journey in my 46-year-old Lamborghini Espada. The lascivious, green four-seater had become an Airbnb for garage spiders over the months that I ignored it because it wasn't exactly running on all the cylinders

exactly all the time. However, in that moment I convinced myself in the particularly ridiculous way that owners of broken Italian exotics routinely convince themselves that all the car needed was its carbon cauliflowers blown out by a hard run.

My friend Mitch Clements arrived dutifully at my house at three o'clock the next morning, my idea so as to both avoid L.A. traffic and also get us to the big Concorso Italiano show 330 miles north by 8:30 a.m. We rolled out in the darkness, making it just past the first mile before Mitch spoke up. "I don't think she's run-

ning on all 12," he said, quietly, as if talking about someone in the back seat. The car fumbled and pinged. Mitch recently finished restoring his '63 Jag XK-E to lustrous show-winning brilliance, so his observations carry tonnage. "Just needs to warm up," I mumbled.

Accelerating north onto the 405, the Espada ran up to speed okay but lacked some of its usual bullish enthusiasm for a deserted freeway. By Santa Barbara we realized that it was boozing on its 21 gallons like Dean Martin back in old Napoli. Barely 180 miles up we had to stop and re-brim the twin 10.5-gallon tanks, the Espada burning gas at exactly twice the rate of the Cessna. Well, we were too far into the journey to quit, so we kept calm and carried on. Reaching the show, the car was barely able to

scramble up the last hill to its parking spot.

I went over to my friend Bob Huber, a professional Lambo mechanic in Los Angeles, and described the symptoms. "It's those dang pistons in the carbs," he said, and yes, he really did say "dang" because Bob is nice. Immediately, I knew which dang pistons he was talking about. The Weber DCOE side-draft carb—there are six on an Espada—is a marvelous mixer of air and fuel, but it ages about as gracefully as a cone of triple gelato. The mechanism by which you choke a DCOE to enrich the mixture for cold starts involves a couple of small brass pistons in each carb that, when cranked up by the driver via the choke cable, allow a copiously rich mixture for those cylinders. A back-spit by the engine, common on startup, can drive the pistons up, and if they're getting a little gummy with age, they'll stay up, meaning those cylinders are deluged with fuel and there's nothing the driver can do about it from the cockpit.

Nothing on an Espada is an easy fix—except this. After the show, Mitch and I popped and pinged over to my friend John Lacey's motel and spent the next hour opening the carbs and cleaning up the pistons with some fine emery board. John got at CVS. John and Mitch have been coming to Monterey since the mid-'60s, and as they worked—what are friends for if not to fix your busted Lambo?—they reminisced about park trees they had slept under and the cops that had run them off and Peter Revson in the Corkscrew.

After we buttoned up the carbs, the engine ran flawlessly, the fuel economy rocketing from 9 mpg to 12. It's a happy memory, partly because it's so rare that friends can come together in a motel parking lot to fix a broken car and actually fix it. So often the project stalls because you need a shop that will weld cracked aluminum on a Saturday night or parts from Fukuoka.

The thing about a plane is that when you have a problem, it's almost never a laughing matter. A Lamborghini Espada, on the other hand, never runs out of ways to make you laugh. Or put your friends to work. Things happen for a reason, I guess. ■



FRIENDS HELPED SAVE THE GREEN FLYER AFTER A ROUGH LANDING AT CONCORSO.

Aaron Robinson

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THE SIXTH-GENERATION 2017 CAMARO

AS TOLD FROM AN ENGINEERING AND DESIGN PERSPECTIVE.

Most things come and go and don't leave a mark. But some things leave such an impression that they're immediately unforgettable. Such is the Chevrolet Camaro. Here, Chief Engineer Al Oppenheiser and Design Director Tom Peters explain how every generation of Camaro has led to this, the most impactful Camaro yet.





TOM PETERS

CHEVROLET DIRECTOR OF EXTERIOR DESIGN -
PERFORMANCE VEHICLES

How would you describe the appeal of Camaro over the years?

There's something intrinsic in the shape and character of it. It's more than a good-looking machine. It's a unique personality that people want to be associated with. It's the same appeal that a young kid has for a cool car. I don't know another way to put it. And it's kind of wonderful.

Tell us about your design history with Camaro.

I started around 1984-85. I remember working on the IROC-Z in the Chevy 3 Studio under Jerry Palmer. I've been involved with Camaro ever since, especially Gen Five and Gen Six.

Tom, you have been front and center with Camaro designs for many years now. What did you wish to accomplish with Gen Six?

We wanted to modify the platform to achieve proportions that I think were critical to the success of Camaro. For me, Gen Six is all about responding to what we learned from Gen Five on the street. We set out to create a sculptural form that reflected the mass reduction, aerodynamics and just pure beauty.

“ We set out to create a sculptural form that reflected the mass reduction, aerodynamics and just pure beauty. ”

Tom Peters

CHEVROLET DIRECTOR OF EXTERIOR DESIGN - PERFORMANCE VEHICLES



AL OPPENHEISER

CAMARO CHIEF ENGINEER

What makes the 50th anniversary of Camaro significant?

The 50th is so important because we all grew up with Camaro. I've always said that you don't have to go very far to find someone who owned a Camaro, whether it was you, your brother, your dad, your girlfriend, buddy, whoever.

What's the DNA of Camaro?

It's always been about performance. Design wise, it's the strong shoulders, the long dash to axle, the aggressive windshield. No matter what generation you have, from 1967 until today, you get in and it just makes you smile.

Talk to us about some of the powertrain offerings in Gen Six.

It's all about lighter, meaner and leaner. I love them all, but I'm particularly proud of the new 2.0L Turbo 4-cylinder. It's anything but a base car. It's designed for people who love 4-cylinder tuner technology. We've upped the 3.6L V6 to 335 horsepower with fuel-saving technology¹ like Active Fuel Management.^{TM2} The available 6.2L V8 in the SS takes you up to 455 horsepower with the same kinds of fuel-saving technologies³ And the Gen Six ZL1 is the most phenomenal execution of design, performance, aerodynamics and technology I've ever seen.



¹ EPA-estimated MPG city/highway: Camaro LT with 3.6L V6 engine and 8-speed paddle-shift automatic transmission 19/28; Camaro LT with 3.6L V6 engine and 6-speed manual transmission 16/26. ² Requires available 8-speed paddle-shift automatic transmission. ³ EPA-estimated MPG city/highway: Camaro SS with 6.2L V8 engine and 8-speed paddle-shift automatic transmission 17/27; Camaro SS with 6.2L V8 engine and 6-speed manual transmission 16/25.

Back in 1988, Dustin Hoffman confidently declared the excellence of his driving in *Rain Man*. “I’m an excellent driver” became a beloved 1980s catchphrase, along with “Rumba-bumba-who?” and “Hey, that’s my cheese!”

I don’t want to spoil anything, in case you’re still working through your Tom Cruise VHS backlog, but it turned out that Hoffman was not really an excellent driver. But by the current standards of rampant highway incompetence, *Rain Man* was Ayrton Senna. He could sit behind the wheel and keep his eyes on the road, a feat that 90 percent of the dead-eyed, mouth-breathing licensed public has a hard time accomplishing these days.

Down the road from my house, there’s an intersection where the road splits. Oncoming traffic flows in off the busier street, while the outbound traffic gets a stop sign before turning onto the main thoroughfare. Pretty simple. But at least once a month, I arrive at that intersection to find some combination of skid marks, automotive debris, and vehicular sign-icide, with the signage reduced to metal stumps sprouting from the pavement. Clearly, many a citizen’s peaceful reveries are rudely interrupted by the devious challenge presented by the red octagon. One day I encountered a T-boned Cadillac out in the intersection, its befuddled driver no doubt wondering why the road done ended with cars goin’ all crossways-like.

Anecdotally, we’re crashing a whole lot. I’ve seen more fresh accidents in the past year than I have over the rest of my driving career. There was the guy in the Ford Ranger, spun into the Jersey barrier, hold-

ing his bloody nose. There was the overturned SUV on the shoulder in South Carolina, a woman sprinting toward the police barracks just up the highway. I witnessed an F-350 commit Ford-on-Ford violence when traffic slowed down but it didn’t, spelling bad news for the Transit Connect

just ahead. Last year, the U.S. highway fatality total actually went up, despite the fact that every new car is safer than the last. What the hell’s going on?

Well, it’s phones. Duh. I don’t even want to ride my bike anymore because I’m afraid some moron’s going to

Snapchat me into the Tour de Mort. I’ve lost count of how many times I’ve seen the car ahead of me lazily drift onto the shoulder only to veer back onto the pavement and then, 30 seconds later, fade left across the centerline. Ten years ago, you’d think “drunk” and maybe call the cops. Now we just shrug it off because dangerously sloppy driving is so completely commonplace. Did you know that last year, Americans spent 213,000 workdays sitting behind someone who didn’t notice that the light turned green? I just made that up, but the real number is surely higher. Personally, I feel that this particular problem could be solved by lasers—by which I mean that we mount high-powered lasers in the traffic signal, and if you sit through half a green then your engine block gets turned into lava. Don’t



complain; you would suddenly have something interesting to Periscope about.

I was optimistic that Apple CarPlay could save us iPhone users from ourselves, but CarPlay is an invasive species, like the Asian carp for which it is named. Instead of your car being your car and your phone being your phone, you get an unholy monster with an abnormal brain. Awhile back I was at Bose to get an early listen of the Panaray system in a Cadillac CT6, and I found that CarPlay wouldn’t let me access all my Apple Music playlists, even in a parked, non-running car. So you disable CarPlay and stream music through your phone, thus defeating the whole purpose. And if you’re running Waze, CarPlay will commandeer the stereo system to shout out road-hazard alerts, forcing you to switch back to whatever source you were using prior to that smooshed possum. CarPlay makes you want to chuck your phone out the window at 70 mph, which, come to think of it, might be the endgame. Time for an upgrade!

I’ve never prioritized safety as a buying consideration, but I might have to rethink that the next time I’m car shopping. Last year I visited the Insurance Institute for Highway Safety and was surprised to learn that there can be a big spread between cars in any given class. Basically, you want the latest design and a car that’s as massive as possible from a company with a good safety record. I’m thinking that when my kid turns 16, I’m going to get him a Volvo A40G articulated dump truck. That’s 68,000 pounds of road-hugging weight and a top speed of 35 mph. The IIHS hasn’t tested it, but I’ll bet it would do just fine in a small-overlap collision.

Short of driving a tank, we’re on our own until someone reconciles the conflict between phones and driving. I’ve got a friend who now purposely avoids 55-mph two-lanes because he doesn’t trust his fellow citizens with 110-mph closing speeds. That’s sad and depressing, and I’ve started to do the same thing. And not just out of disdain for everyone else. Because if you think of yourself as an excellent driver, then chances are you’re not. Definitely not. ■

Ezra Dyer



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Well, here's one for the bucket list. I used to "borrow" *Car and Driver* magazines from the local barber-shop when I was a kid, and now I'm writing a guest column. ¶ More than 40 years have gone by since then and a lot of things have changed in

the auto industry, but you know what they say: "The more things change, the more they stay the same." What I mean is that what it takes to develop a high-performance automobile or to improve design platforms are the same basic principles that Henry Ford, Harley Earl, and Zora Arkus-Duntov used to create some of the most desirable cars in history. We in auto racing must still obey the same laws of physics that propelled Andretti, Foyt, and Gordon to victory.

What has changed the most are the tools we use to develop, design, build, and test. When I started racing, we used experience, intuition, a tape measure, and strings to set up cars. We used stopwatches, tire pyrometers, and driver feedback to make them go faster. I had a "black book" with all my notes and secret formulas.

Auto manufacturers knew a win on Sunday would help sales on Monday. They also knew that motorsports would be a great way to develop and test high-performance parts for the street. This manufacturer participation created some great battles in NASCAR as well as the old Trans-Am series. Unfortunately, the development and validation process took time, largely due to its being based on team input, durability, and on-track performance.

Now we have laptops, simulation, Pi System data loggers, infrared thermome-

ters, GoPros, and live, real-time telemetry access to data. The development of these tools has done more than make the cars go faster; it's made the competition both tougher and closer.

The tools take some of the human element out of problem solving and have made process as important as experience. They give you accurate information in real time and instantly provide direction for adjustments. Engineers who are motivated to win know what questions to ask, and understanding the process for finding the answers is now much more valuable than my old black book. I'm certainly not complaining, because these tools have pushed our performance forward; I am merely pointing out that even the best racers have had to change their decision-making process.

Sometimes, even though we know something may have worked successfully in the past, we have to let go of it and head in a different direction based on what we see is actually happening in the data. We collect accurate suspension travel, tire-pressure readings, and driver input, which sometimes causes some pretty interesting conversations.

Driver: "I was wide open through turns three and four."

Crew Chief: "Oh, really? The throttle trace shows only 80 percent."

Driver: "Well there must be something wrong with the sensor."

We also have brake pressure, steering input, and engine rpm available. This data not only helps the crew chief find speed in the car, it helps the driver understand more about what he can do to be quicker.

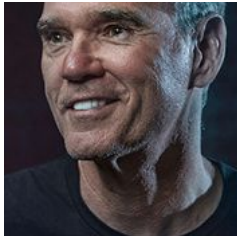
Just as younger engineers are able to hold their own with more-experienced crew chiefs, the tools now allowed in NASCAR are helping younger drivers become more competitive with racing's big names in a shorter period of time. All three manufacturers involved in NASCAR now have F1-level driving simulators that have been instrumental in speeding up the learning curve for many young stars.

Working with the auto manufacturers on the process by which we use these tools has been a two-way street as well. The team at Hendrick Performance worked closely with Chevrolet to test parts and pieces for the new-generation Camaro performance line using the same process and tools we used to develop the cars that have brought 11 NASCAR Cup championships to Rick Hendrick. We are able to deliver accurate data faster, which not only helps build a better piece, it cuts time to market.

We aren't the only team doing development projects. I'm sure that Roush and Penske work closely with Ford to provide data and feedback on new components for the high-performance Mustang. The fact is, because of these new tools and the way we gather data, you can now buy a car off the showroom floor that will outperform many of the early race cars I worked on.

The technical advances in the tools we use have made our cars better and have made drivers better. Today, not only can you go to the dealership and buy a car that can turn laps faster than the old Trans-Am warriors, you can install a ready-made data recorder that will help you drive like Donohue and Follmer.

The laws of physics haven't changed, and the battle for the fastest machine still wages, and the commitment to continuous improvement is as important as ever. But the tools we use, well, they're different. ■



Ray Evernham

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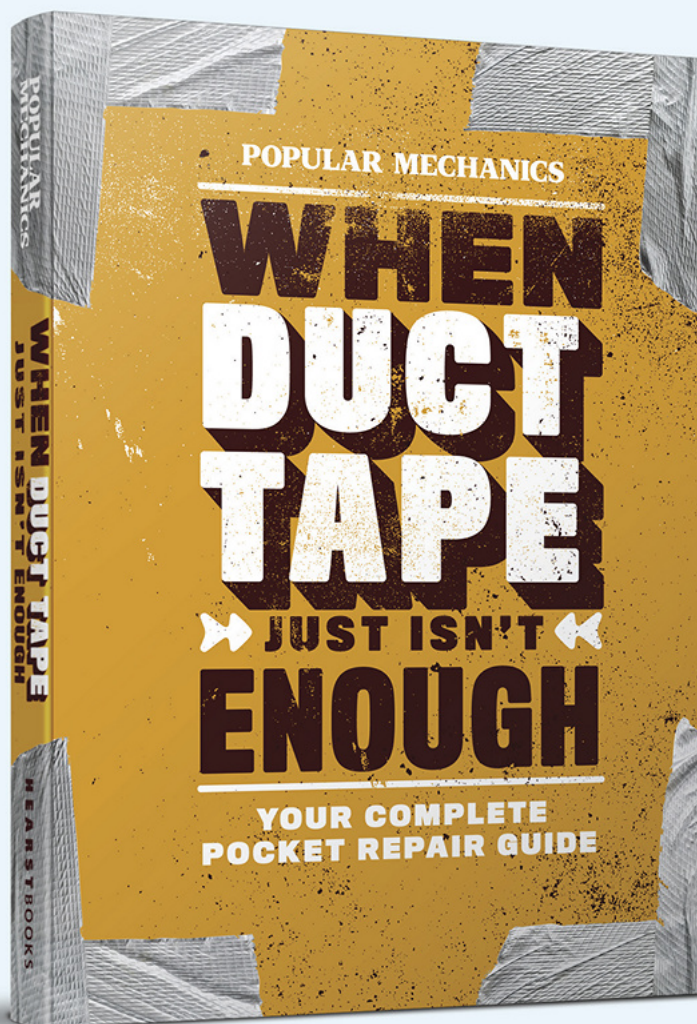
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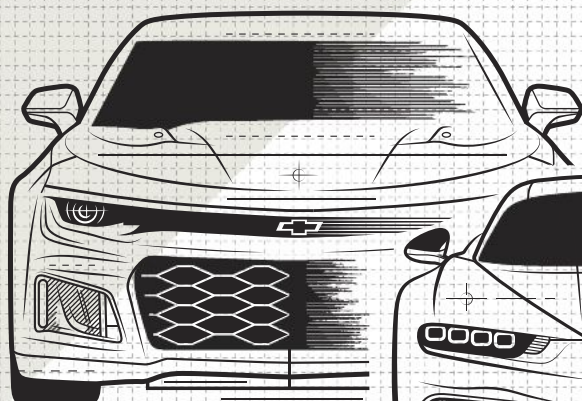
Arresting Development

TO OUR TEENAGE SELVES there was only one thing more enticing than the idea of developing new cars. And her name was Megan. As development engineers, we imagined, we would casually lay down heroic laps on world-famous race courses in awesome experimental works of wonder. We would be able to tell if the right-front tire was down a half pound of pressure thanks to our supernatural sensitivity to all things automotive. We would go to exotic places. Megan would probably dig us. We might even be a black belt because, well, because that would be sweet. What we did not expect was that in the real world of development engineers, we would have to know what the durometer scale was, or wear corporate-logo shirts tucked into our khakis, or that we'd be stuck trying to tune the life-sucking crappiness out of a Cutlass Ciera before it sucked the life out of us.

But our old fantasy exists out there, and it is represented on the next 14 pages. You see, precious few people land jobs working on the cars—and in the places—of pure fantasy. Testing Lamborghini Aventadors on the Nürburgring? Yes, that's a job that exists, at least some of the time. Tooling around the American Southwest in a fleet of cars so rarefied that most enthusiasts will never even lay eyes on one? Sure. And true, most women still won't dig us—at least not because of our job. But whatever, we're leaping off the track surface in a 650-hp Camaro ZL1. We've accompanied the folks doing the dream work on three of the most powerful and exciting cars coming down the pike during low-speed, high-speed, and vomit-speed testing, here and abroad. And, no, it never worked out with Megan.

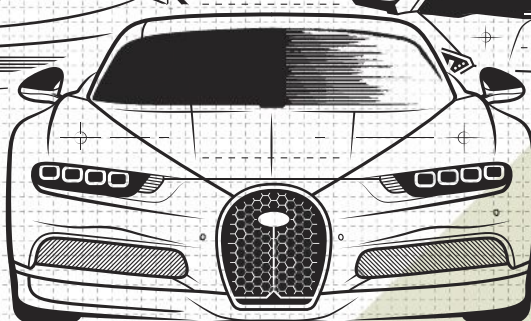
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2017 CHEVROLET
CAMARO ZL1



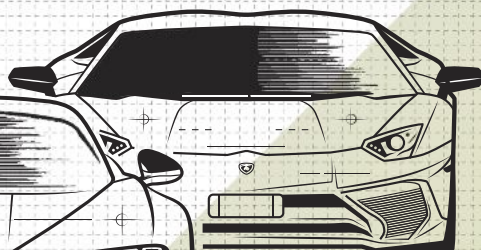
No.2

2017 BUGATTI
CHIRON



No.3

LAMBORGHINI AVENTADOR
SV PROTOTYPE





Ballistic Leaf

Blower

A blue 2017 Chevrolet Camaro ZL1 is shown from a front-three-quarter perspective, driving on a racetrack. The car is in motion, with a blurred background of green grass and a metal guardrail. The driver is visible through the windshield. The car's front grille features a large black honeycomb pattern with a silver Chevrolet bowtie in the center and a red 'ZL1' badge on the right side. The headlights are on, and the car is casting a shadow on the track surface.

✓ 2017 Chevrolet Camaro ZL1

RIDING SIDEWAYS IN THE MOST POWERFUL
CAMARO IN HISTORY, WE LEARN THE VALUE OF BIG
POWER, BIG NOISE, AND TOTAL CONTROL.
_by Josh Jacquot _photography by Tom Salt

Bursting airborne and sideways, wheels stretching for the ground, the raw, stunningly rapid, and now very aloft Chevrolet Camaro ZL1 should be a barbaric, deadly thing. Yet, in the crucial milliseconds following its oblique touchdown, it defines itself differently. Aaron Link, the ZL1's lead development engineer, adds a breath of countersteer, stays in the gas, and carries the slide, fully committed, to the track's edge. Crimson leaves explode behind its rear diffuser, then waft to the ground in what remains of the ZL1's throat-punch exhaust note. The most powerful Camaro ever made fires a round of upshifts into the autumn air and hurls itself at the next corner, unfazed.

It's a hell of a way to start the day.

"That's the eLSD," says Link, referring to the ZL1's electronically controlled limited-slip differential, which it shares with the SS 1LE trim for 2017. "It's scenarios like that that really sold us on the eLSD, despite its weight penalty." The ZL1's active diff weighs 44 pounds more than the clutch-type limited-slip differential in the Camaro SS, but it's lighter than the massive 9.9-inch diff in the fifth-generation ZL1. And neither of those offered as much authority over these sorts of automotive gymnastics.

GM calls this ability "yaw damping" and offers no shortage of data to prove it works—all of which are less convincing than 1 minute and 53 seconds on its Milford road course. That's about the time the ZL1 is capable of posting around the famed development track. Chevy won't reveal the exact time but says it's about three seconds quicker than the last ZL1, which ran a 1:56.



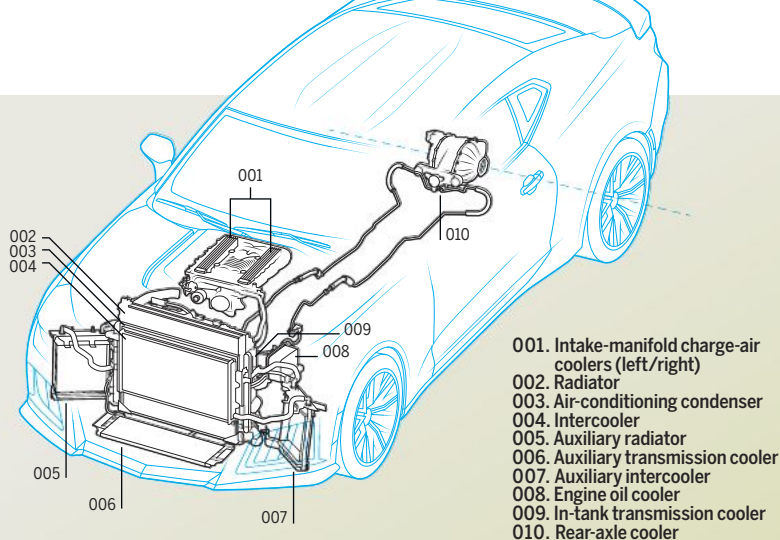
The ZL1, available as a coupe and a convertible, shares with the Corvette Z06 its herculean powerplant, the supercharged 6.2-liter LT4 V-8. Internally, both mills are identical—right down to the titanium intake valves and forged rods and pistons. In this latest King of Camaros, however, a conventional oil pan replaces the Z06's dry-sump lubrication. Surprisingly, a lack of packaging space demanded the change. But what matters is this: 650 horsepower at 6400 rpm and 650 pound-feet of torque at 3600 rpm. It's all managed, aurally, by a dual-mode exhaust, which is now electronically controlled rather than vacuum actuated as it was on the last ZL1. Chevy offers two transmissions here, including a high-torque version of the six-speed Tremec TR6060 that's available in the Camaro SS. A tailored gear-

The "flow tie" hollow Chevy grille badge, borrowed from the old Z/28, graces a front end that is constructed almost entirely of air intakes.



Tech Highlight: Cooling that goes to 11

That the ZL1 packages 11 heat exchangers into its powertrain shouldn't surprise you. Six hundred and fifty, after all, are a lot of ponies to chill. Of the 11, seven are air-to-liquid coolers and four are liquid-to-liquid. There's an air-conditioning condenser packed in there as well because drivers need cooling, too. Chevy engineers came up with a novel solution for keeping the ZL1's active differential from cooking its lube. Cooled transmission oil is routed to a heat exchanger inside the differential housing where it extracts heat from the differential oil. An auxiliary transmission cooler is packaged horizontally and sits under a wind-tunnel-designed cover that protects it from road debris and increases flow through its core. Cool.



- 001. Intake-manifold charge-air coolers (left/right)
- 002. Radiator
- 003. Air-conditioning condenser
- 004. Intercooler
- 005. Auxiliary radiator
- 006. Auxiliary transmission cooler
- 007. Auxiliary intercooler
- 008. Engine oil cooler
- 009. In-tank transmission cooler
- 010. Rear-axle cooler

set allows the manual-transmission-equipped ZL1 to hit 60 mph in first gear, while both fifth and sixth are overdrive gears. At 0.54:1, sixth gear is a true fuel-economy cog, though the 3.73 final-drive is still low enough to serve up shovel-to-the-spleen holeshots.

But the 10-speed automatic, co-developed with Ford, is the one that's so hotly anticipated and the one we experienced from the passenger seat. Even from that chair, it's clear that it will be the go-to gearbox if minimizing lap times is a priority. Chevy engineers compared the 10-speed's shift times with those of the dual-clutch units in the 991 Porsche 911 Carrera S and the McLaren MP4-12C, which admittedly are not the newest iterations of those cars. The differences, though small, fall convincingly in favor of the Chevy. Here the 10-speed uses a ZL1-specific torque converter, clutch components, bearings, software, and controllers. Its 0.64:1 10th gear is numerically lower than what the transmission will offer in other applications. Ten-speed-equipped ZL1 coupes will have a 2.85:1 final-drive ratio. Convertibles will be 2.77:1 and won't get the eLSD. Most striking is the gearbox's ability to keep the LT4 engine almost indefinitely in the most potent portion of its rev range. When it's working hard, the 10-speed is all nervous energy, ripping through tightly spaced gears with unrelenting pace. The resultant thrust and sound are gleefully rewarding. Enough so that Link says the automatic is the component of the car that makes him most proud. "It just never falls off," he says. "Even at the higher speeds we see on the 'Ring [the Nürburgring Nordschleife, where GM partially developed the ZL1], there's always a building sensation to this car's acceleration."

Four drive modes influencing all the car's manners remain: snow/ice, tour, sport, and track. It's likely, though, that the 10-speed has crossed the don't-bother threshold when it comes to do-it-yourself paddle shifting. Even Link admits that it's hard to know whether to go down three gears or four in certain scenarios. But, let's face it, the days of shifting automatics yourself stopped being rewarding back when they reached seven gears. Using

drive, as Link did on our ride-along, frees up brainpower for steering and braking. If you want to shift yourself, get the six-speed.

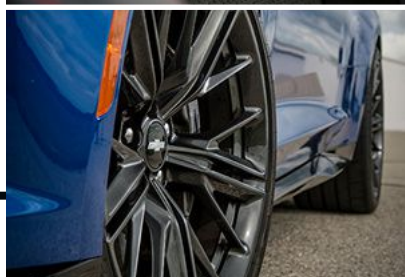
Back at Milford, a few corners later, Link shortens a bend and squares up the curb's leading edge with the ZL1's right-front tire.

The ZL1 has a line-lock feature for those who enjoy turning their rear tires into smoke, but the car was, instead, designed to destroy its tires on a road course.

It's a move that should deliver a full-wind-up nut shot to the spring and damper, further ventilating the already thoroughly ventilated hood. But the ZL1 shrugs off the blow and sticks unflinchingly through the remaining esses, launching us to 160 mph on the front straight, which isn't really straight at all. Magnetorheological dampers, standard on the ZL1, play no small role in the car's preternatural control and are perhaps the greatest ally to the car's Performance Traction Management system, which applies the exact torque the rear wheels are able to put down in virtually any scenario. How effective is the ZL1's PTM system? So much so that Drew Cattell, the ride-and-handling engineer who drove the ZL1 for its Nürburgring hot lap, relied on its reassurance through the Green Hell's 12.9 miles. Link, during our laps, drove fully unrestricted.

Chevy hadn't released the ZL1's official 'Ring lap time as of our deadline. But it did say that the new car is more than 11 seconds quicker than the previous ZL1's 7:41.27, which makes it a 7:30 or better. We've seen data logs confirming that it's 10 mph faster than the old ZL1 (call it about 182 mph) going into Tiergarten, the fastest section of the track. A mid to low 7:20 seems possible.

Broad-shouldered, wide-hipped, and gape-mawed, the ZL1 is a caricature of the now devastatingly ordinary SS. Its front fenders are 0.6 inch wider on each side than the SS's, partially to cover huge rubber and partially to allow more cooling air to the array of heat exchangers housed in the ZL1's nose [see tech highlight]. And that hood? It's a functional two-piece aluminum-and-carbon thing that extracts air from the engine compartment. Wind-



C/D UNDERBELLY

(001) Underbody strakes on the front air dam direct airflow around the front tires, reducing lift. (002) The auxiliary transmission oil-cooler cover hangs below the rest of the underbody and is vented on the sides and rear to draw air through the cooler. (003) A conventional oil pan replaces the dry-sump system used on the LT4 in the Corvette Z06. (004) The control module for the electronically controlled limited-slip differential resides on the back of the rear suspension crossmember. (005) Electronically controlled valves operate the dual-mode exhaust.

tunnel time largely determined the shape of the ZL1's nose, which divides its work between managing lift and drag and cooling the powertrain and brakes. Despite its Sofia Vergara-esque bulges, this ZL1 presents about 2 percent less frontal area than the previous model, which, coupled with an additional 70 horsepower, should yield a measurably improved top speed. GM isn't releasing that number yet, but the fifth-generation ZL1 managed 184 mph flat-out. We expect this ZL1 to just miss the 200-mph club.

Forged 10-inch-wide front and 11-inch-wide rear wheels wear 285/30R-20 and 305/30R-20 rubber, respectively. Goodyear, once again, is the ZL1's tire supplier, and it worked with engineers through many variants of its Eagle F1 Supercar tire before arriving at the final compound and construction, which is called G:3.

Carbon-ceramic brake rotors, like those offered on the 2015 Z/28, aren't available. This is both a cost-control measure and a practical one, as the iron brakes meet GM's performance targets. The ZL1's two-piece 15.4-inch iron front rotors are clamped by fixed, six-piston Brembo calipers. Even with hefty brakes, the Alpha platform nets the ZL1 a 220-pound weight savings over the last model; at about 3950 pounds when equipped with the 10-speed automatic, though, it's certainly no featherweight. Still, it's quicker. Chevy says 10-speed-equipped coupes should hit 60 in 3.5 seconds and hammer through the quarter-mile in 11.4 seconds at 127 mph.

2017 CHEVROLET CAMARO ZL1

VEHICLE TYPE: front-engine, rear-wheel-drive, 4-passenger, 2-door coupe

BASE PRICE: \$62,135

ENGINE TYPE: supercharged pushrod 16-valve V-8, aluminum block and heads, direct fuel injection

DISPLACEMENT: 376 cu in, 6162 cc

POWER: 650 hp @ 6400 rpm

TORQUE: 650 lb-ft @ 3600 rpm

TRANSMISSIONS: 6-speed manual, 10-speed automatic with manual shifting mode

DIMENSIONS

WHEELBASE: 110.7 in

LENGTH: 190.2 in

WIDTH: 75.0 in

HEIGHT: 52.9 in

PASSENGER VOLUME: 85 cu ft

TRUNK VOLUME: 9 cu ft

CURB WEIGHT: 3950 lb

PERFORMANCE (C/D EST)

ZERO TO 60 MPH: 3.5–3.9 sec

ZERO TO 100 MPH: 7.3–7.7 sec

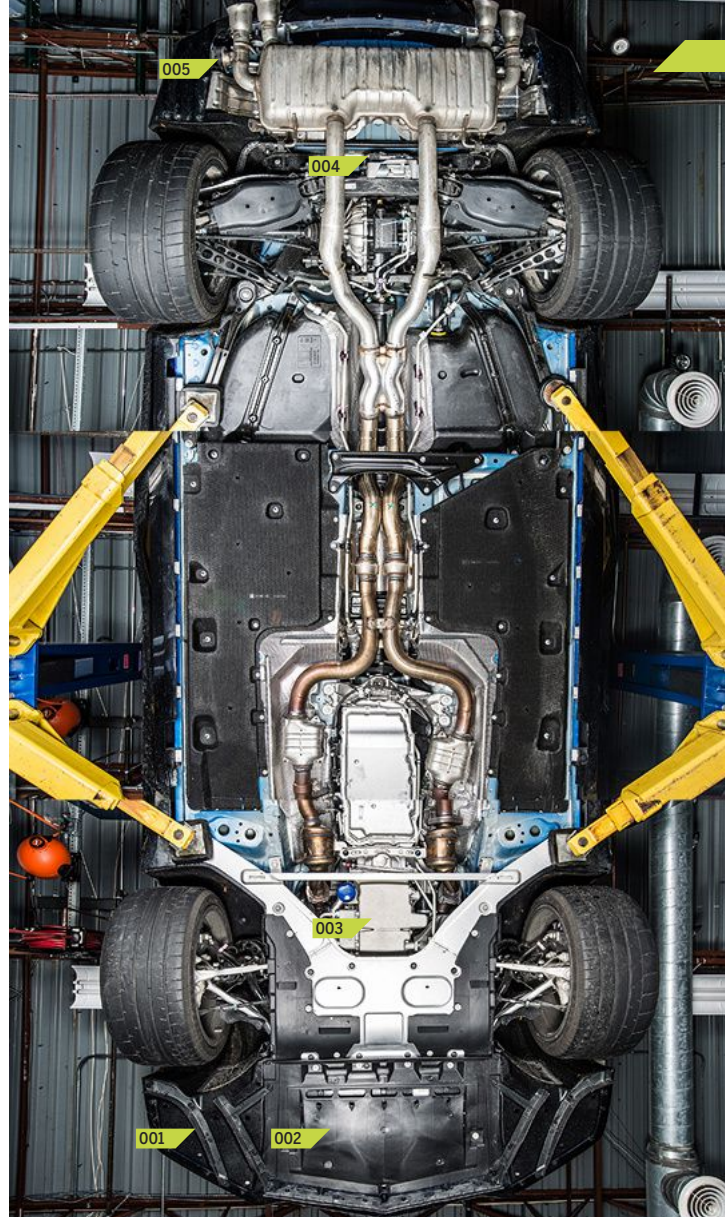
1/4-MILE: 11.4–11.9 sec

TOP SPEED: 195 mph (est)

FUEL ECONOMY (C/D EST)

EPA COMBINED/CITY/HWY: 13–15/11–12/

19 mpg



Customizable launch control that allows adjustable engine speed and wheelslip between 5 and 15 percent is standard and can be had with either transmission. And, keeping pace with Ford, the ZL1 now offers line-lock, a feature that clamps the front brakes but leaves the rear free for epic burnouts. It's so buried in the instrument-cluster menus that even Captain Liability himself couldn't accidentally activate it.

Chevy is prepared to sell you a ZL1 coupe for \$62,135 when it goes on sale this month. The convertible will follow in the spring for seven grand more. Both will be subject to gas-guzzler taxes, and their gratuitously burned hydrocarbons will be worth every extra penny.

It shouldn't surprise us that this car can at once be so unapologetically raw and yet so seemingly controllable. So loud and yet so articulate. Finding those traits melded in a single piece of hardware like the ZL1 is one of the great joys of being a car enthusiast today. And it's quite likely that the ZL1 is the most rewarding means ever created to move leaves off a racetrack. ■



On a Highway

IN DEATH VALLEY, BUGATTI ENGINEERS DO A VERY SLOW TEST ON A VERY FAST CAR.

—by Juergen Zoellter

“Where the hell do you put silverware in a Bugatti?” the customs officer asked, staring at the eating utensils packed in engineer Dennis Rohlfs’s fancy aluminum Zarges case, which was otherwise filled with spare parts for hot-weather testing of the new 1500-hp Bugatti Chiron. At Bugatti, even the engineers have expensive luggage. Rohlfs explained that he wanted to show good manners in America by using a knife and fork when eating the hamburgers he expected to be deluged with out in the desert west. Shaking his head, the customs officer let the weird foreigner pass. Welcome to America.

That episode was two weeks ago, and Rohlfs’s silverware remains unused, lying in his box between the cables, seals, and other exotic Bugatti bits. He has already learned to eat burgers with his hands, lest he draw unwanted attention or marriage proposals, and those same hands are currently on the steering wheel of “PT5.10.” That’s the glamorous name for our blue-and-white development car, what the industry calls a “pre-series” model from the earliest stages of production. Together with three more Chiron development cars, PT5.10 is cruising on 120-degree tarmac, the tires a toasty 149 degrees by the test-equipment sensors.

It is 10 a.m., and we are loafing along doing the double-nickel. Fifty-five mph is not even one-quarter the car’s top speed. The crankshaft of the huge 8.0-liter, 16-cylinder Gorgon in back turns lazily at 1500 rpm in seventh gear. “That’s a moderately raised idle speed,” says Rohlfs, smiling. Out from Volkswagen headquarters in Wolfsburg, Germany, Rohlfs is responsible for a very specific widget on the W-16, the ionization-current misfire-detection system that effectively turns each spark plug into a sensor. Judging from Rohlfs’s nonchalance, the Bugatti is barely breaking a sweat. This despite the fact that it’s being slow-roasted on the pavement of Death Valley, where the famously lung-collapsing summer heat annually draws a few German tourists intent on proving their hardiness by jogging into the fiery teeth of the afternoon—only to be later found as dead as dried prunes.

in Heat



2017 Bugatti Chiron ▲

And why should any of the car's readings be abnormal? Isn't the W-16, as well as the rest of the Chiron, but a mere evolution of the gobsmacking Veyron that preceded it? The Veyron went into production in 2005, and, after 450 copies built, how many glitches can there possibly be left to uncover? Well, it's not quite that simple, we found out after talking with Bugatti's head of engineering, Willi Netuschil, and his team, also frying their carcasses out here in Death Valley for the glory of Molsheim.

"We started the development of the Chiron as a facelift of the Veyron, and we ended up with a completely newly developed high-performance car," he explains. In particular, the goal of raising horsepower from 1200 in the late, great Veyron Super Sport to 1500 in the Chiron led engineers to make a few conceptual changes. The Chiron is no power-tuned Veyron. "It is a completely new car with different driving behavior," Netuschil insists. Well, okay!

Our impression, after many hours in close contact with Chirons in different stages of development, is that the new Bugatti is in no danger of being deposed as the fastest GT in automotive history. A breathtaking monster of a machine, it is nonetheless neither wild nor brutal but amazingly easy to handle. A coupe offering high comfort, equipped with state-of-the-art safety features and excellent handcrafted details, it is a finely honed object of ultimate driveway jewelry, priced at 2.4 million euros or whatever the spot exchange rate is in dollars (about \$2.7 million at this writing).

"For raising up the engine power by 300 horsepower [compared with the Super Sport], we did not just build in bigger turbochargers," says Netuschil, "because the result would have been an almost undrivable car due to brutal throttle and acceleration response." In the end, the engineers decided to go for a tiered intake-pressurizing system of a type never tried before on a gasoline engine for the road. "So, technology-wise, we went into uncharted waters," Netuschil says.

The heart of the complex system is a pair of air shut-off valves. Under low load, they block the exhaust flow to two of the engine's four identical turbochargers so that only half of them initially make boost. The valves open to wake the other two snails around 3800 rpm, but are phase-lagged so that the third turbo starts spooling a little bit earlier than the fourth. The secondary turbochargers accelerate and all four blowers reach the same turbine speed between 3800 and 4000 rpm, and then, with all the oars in the water pulling, the engine really gets going.

It all sounds very simple, an effort to deliver the W-16's massive firepower not in one enormous bang but in a measured and civilized surge. In reality, however, the scheme demanded a complex development process requiring endless miles of testing. For example, the engineers started with exhaust-gas-regulating flaps from Volkswagen's Paris-Dakar racing Touareg. But what worked perfectly in that diesel engine was not robust enough for the extreme high-temperature flow of the Bugatti's gasoline exhaust system. In the end, Bugatti engineers needed and developed more-robust metal and ceramic materials for the air flaps, actuators, and mountings.

During our drive, engineer Michael Gericke played attending doctor to this

complex boost system as it sucked the blistering dry heat of the lowest spot in North America. "In Death Valley, it has to show its reliability in real life," he says, implying that Death Valley in the summer is real life. At the very least it is the devil's own pottery kiln, a circle in Dante's *Inferno* where they send the people who complain about the air conditioning in their Ferraris.

Following essential initial materials changes, the entire drivetrain needed to be upgraded, with new aerodynamic thermal management to maximize airflow in and out of the car. Bugatti developed more-powerful control computers for the car, as well as the obviously new body shape on top of the (now) all-carbon-fiber-compound structure. By the time we come along, all the hardware development has been tested to a fare-thee-well, which is why we're doing 55 mph. The engineers are beyond the "stress tests" during this hot-climate testing, says Netuschil. Here in Death Valley, all the systems have to show perfect reliability on normal, regular daily drives. Netuschil: "We are driving like a Chiron driver will do in extreme heat," meaning, most likely, those Chiron drivers who live in the sandier and more intemperate parts of the world where petroleum is the family business.

In fact, this slower-speed test creates very special difficulties for cars like the Bugatti. Unlike with a sedan's four-cylinder front-

mounted engine, there is pretty much no headwind reaching the Chiron's fully encapsulated mid-mounted boiler at low speed. That's why all cooling systems in the Chiron are working under maximum load. "The stress at low speed is much higher than at fast speed," Netuschil explains.

The control computers are permanently monitoring and adjusting a total of 51,552 different points of data. As soon as some imperfection pops up, the engineers go at the problem, wading into a jungle of 31,974 possible adjustment points in the control map. On location, and via laptops sitting on the passenger seat, an enormous amount of data flows from the ionization-current system alone.

The data is generated by the ignition coils, one per spark plug, and from time to time it indicates a misfire. At that point, Rohlfs immediately stops talking, pushes the Chiron into various driving modes, changes the gears manually, and makes the engine work under various load conditions. He has to find where the misfire is coming from. After a while, he pulls over, grabs his laptop, and plays on the keyboard like a virtuoso, twisting the adjusting screw of the digital age.

We get gas, and our small armada of Franco-German cruise missiles with a combined 6000 horsepower departs the convection oven of the Valley, climbing up into the surrounding mountains. Highway 374 toward Beatty, Nevada, is an ascent that takes almost 30 minutes. Suddenly, Gericke starts sniffing the air like a coonhound trying to pick up a scent. Gericke is responsible for the OBD system (onboard diagnostics). Does he smell something? We arrive at the 4316-foot Daylight Pass and pull over, Gericke now out of the car and sniffing

Even the world's least tedious car needs to be capable of the most tedious driving. That requires tedious testing and also hamburgers.



hard. In the Valley, we had filled up with fresh, relatively cold gasoline. By now, the fuel has warmed and is outgassing, which can cause both an unpleasant smell as well as a failed EPA shed test. To avoid that, the Chiron's active carbon canister needs to be flushed with air. Gericke at last announces that he does not smell any fuel. He looks satisfied. The canister purge capacity is sufficient now, and another box is checked. We turn our cars around and head back into the kiln toward the lowest point in North America, Badwater Basin, descending over the next 36 miles from more than 4000 feet to minus 282 feet.

Four Bugatti Chirons in formation, a surging flotilla of starships from Planet 10, are rolling out a low-frequency sound carpet over one of the hottest regions on earth. They decorate this desert with road-legal, high-performance technology never imagined by the prospectors who once populated this place and thought that their 20-mule teams were pretty tough stuff. Broad, flat, and crouching on the tarmac, the Chirons blink through their pairs of quad-eyed headlight clusters. It looks as if they are on the alert, on the *qui vive*, prepared to jump to hyperspace at any moment. "No," says Netuschil, "not here! High performance we only test on race-tracks." Germans are nothing if not rule followers.

Though the Death Valley excursion is a test of extreme thermal stress under cruising conditions, the trip is also proving to be a kind of test marketing of the styling. Tourists chase us into a parking area, where the engineers read engine-temperature data while the fashionably modern three-eyed bystanders record every detail through the two orbs in their faces and the unblinking one on their phones. Suddenly, at Furnace Creek, a hard-braking minivan with wailing tires disturbs the quiet. Like a parachutist, a guy jumps out of the still-moving vehicle. "Are . . . these . . . real . . . Bugattis?" The man, apparently Australian, is trying both to speak and gasp for air. He doesn't wait for an answer. "I never expected to see a real Bugatti! Here's four! Unbelievable! You made my holiday, guys."

Unaffected, and perhaps not even understanding the man through his breathless accent, the engineers continue checking endless columns of figures and charts. Gericke is watching the stability of the cooling temperatures for the turbochargers; Norbert Marek shuts off the engine of PT5.10 for exactly one minute, then fires it up again to check if every cylinder follows the precisely defined timing. Transmission man Siegbert Slobianka is kvetching about the gearbox behavior during deceleration; he doesn't like the little jerk that happens when the 'box downshifts at low engine speed, usually right before the car comes to a stop. He opens his laptop now in order to dive into the deep forest of software, wading deep into the Chiron's own flickering matrix.

Engineers like Slobianka don't talk much. They prefer to demonstrate, as when he executes a downshift from seventh while changing from normal into sport mode. Third gear kicks in, and Slobianka

2017 BUGATTI CHIRON

VEHICLE TYPE: mid-engine, all-wheel-drive, 2-passenger, 2-door coupe

BASE PRICE: \$2,700,000 (est)

ENGINE TYPE: quad-turbocharged and intercooled DOHC 64-valve W-16, aluminum block and heads, port fuel injection

DISPLACEMENT: 488 cu in, 7993 cc

POWER: 1500 hp @ 6700 rpm

TORQUE: 1180 lb-ft @ 2000 rpm

TRANSMISSION: 7-speed dual-clutch automatic with manual shifting mode

DIMENSIONS

WHEELBASE: 106.7 in

LENGTH: 178.9 in

WIDTH: 80.2 in

HEIGHT: 47.7 in

PASSENGER VOLUME: 54 cu ft

TRUNK VOLUME: 2 cu ft

CURB WEIGHT: 4400 lb

PERFORMANCE (C/D EST)

ZERO TO 60 MPH: 2.3 sec

ZERO TO 100 MPH: 4.8 sec

1/4-MILE: 9.4 sec

TOP SPEED: 261 mph

FUEL ECONOMY (C/D EST)

EPA COMBINED/CITY/

HWY: 10/8/15 mpg



If you were thinking of ordering your Chiron in flat black, don't. We prefer PT5.10's Mercury-Villager-Nautica-edition paint scheme seen above.

gives the thumbs up; the transition is perfect. It's amazing how fast this fine-tuning produces results.

After finishing all the steps outlined in "BG744 Hot Climate Approval Death Valley," Netuschil's team continues to Denver and Phoenix, focusing on stress-testing the turbocharger technology at high altitude. Asked about any remaining challenges in his project, Netuschil smiles, a burger the size of the Bugatti's trunk on the plate in front of him. "We crossed the mountain! There are only some approval loops left to do." Even though most Chirons will never voyage very far from their air-conditioned garages, Netuschil is ensuring that the car is ready for anything. And, holding the burger, he ensures that he has also adapted to America. ■

Bringing the

LAMBORGHINI'S AVENTADOR SV
TRIES STEERING WITH ITS
TAIL AROUND THE NÜRBURGRING.

_by Aaron Robinson

Bull





▲ **Lamborghini
Aventador SV
prototype**

Mario Fasanetto goes shrieking through the forests of the Eifel Mountains in a Lamborghini Aventador SV, a car that seemingly came about when Clark Kent and the devil had a baby. The Lambo's body is slashed with cuts and gouged with holes and tattooed with black blades that order the wind to either go through it or around it. The four pipes under the rear origami "bumper" gush blue flame—flame!—a good six inches when the whip comes down on the 6.5-liter, 8500-rpm V-12. This is the car that appears when you call for an Uber in Mordor.

Today is one of those special days when being a car-magazine editor is exactly what everyone thinks it's like all the time. We're behind Fasanetto, Lamborghini's chief test driver, trying to keep up, two ham-handed journalists foolishly given our own 740-hp SVs. One is virtually identical to Fasanetto's stock all-wheel-drive SV, and the other is a prototype with some experimental new gear. All three cars are giant roaring pancakes of fury, ready to rapidly convert a mistake into a long, smeary sculpture of bent and blackened guardrail dusted by shattered carbon fiber. It starts to rain.

In the briefly innocent interlude between the wars, some long-ago lumberjacks cut a deep trench through the leafy blanket of beech and oak and perfumed pines here in northwest Germany and along came the Nürburgring. The workers got the privilege of naming some of the corners, such as Fuchsröhre, which honors a fox that refused to be dislodged during the construction, and Galgenkopf, the former site of a gallows where the ancient Earls of Nürburg held public hangings. Say what you will about the Brickyard and its century of history, there are no monuments at Indy to stuff that happened in the 17th century as there is at Schwedenkreuz, where a cross marks the spot where Swedish soldiers assassinated a local mayor in 1638.

Jackie Stewart gave the Nürburgring a permanent christening when he called the Nordschleife the "Green Hell." He wasn't trying to be glib; blood paints the road from one end to the other. Today the vast facility, dark and moody under a threatening sky, is nearly empty except for the three of us and some participants in a one-day track experience, called Lamborghini Accademia, hosted by Lambo's Squadra Corse motorsports department.

We've been summoned to sample a prototype Aventador SV with four-wheel steering that acts upon revised suspension geometry. Lamborghini has been camped out here for some time already, based out of a cozy chalet in the village of Nürburg near the famous Pistenklause restaurant, where racing greats have autographed the walls and ceiling. As you may have guessed already, this isn't anything like the slow-mo Bugatti Chiron development drive on page 048; at one point your author saw 186 mph.

Besides the rear steering, the experimental Aventador also has a new giant 10.1-inch touchscreen with the usual grab bag

of functionality found in today's units, from web radio to Apple CarPlay. It's all beautifully presented via a high-res, multicolor interface, but if you're thinking that such features seem as superfluous in a Lamborghini as they seem necessary in a Toyota Camry, you're not alone. Are Aventador owners really clamoring for Spotify to relieve the monotony of their daily commute? Probably not, but Lamborghini figures that a car with a base price nipping at half a million dollars ought to at least offer the same equipment as cars costing one-twenty-fifth as much.

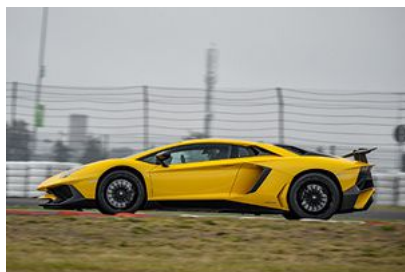
Lamborghini has already announced rear steering on the special-edition \$2 million Centenario, of which 40 will be built. But the brand seems eager to filter the technology down, especially to the Aventador, a car that weighs 3900 pounds in its lightest SV form and feels as big as a Fountain Powerboat. In back, the usual toe-control links are replaced by two individual motorized control units from Germany's ZF that can rapidly swing the barrel-like 355-section Pirellis through a six-degree sweep. It is indeed rear steering, but as with most such setups, perhaps it's more appropriate to think of it as dynamic toe adjustment. Lamborghini also installed a new aluminum hub carrier in back that changes the rear geometry, building in more camber change and reducing caster. The changes promise to make the prototype rear axle one lively place indeed.

The work of development engineers isn't always tedious. Sometimes, it involves beating Aventadors on the Nürburgring. Good work, if you can find it.

Lamborghini not only rented the 12.9-mile Nordschleife, it also took over the much newer, 3.2-mile Grand Prix circuit, famous for its giant Mercedes-Benz star looming over the stadium area and its history of curb-jumping DTM slugfests. We start here, lifting those scissor doors that are still crazy and cramming into the SV's unforgiving seat shells, our helmeted heads rammed into the low ceiling. To start an Aventador, you flip up a red button cover that looks as if it came out of a Minuteman silo and then put fire to the V-12.

It's been a long time since a V-12 dominated any serious form of racing. Formula 1 bid adieu in 1996. Peugeot put the last V-12 on the Le Mans podium in 2009; now that the top class is hybrids, we're unlikely to ever see another. Thus, there's a lot of romantic history balled up in the sound of the Aventador's perfect dozen. Let your imagination go and a wailing Matra MS11 explodes from the Monte Carlo tunnel, or a Ferrari 330 P4 rips the night at Daytona, or Jaguar's purple-and-white Silk Cut XJR-12 thunders down the Mulsanne with Porsche 962s giving futile chase. Until very recently, Lamborghinis raced hardly at all and never successfully, so it's somewhat ironic that its Aventador is one of the few cars today that preserves the faith.

We blast out, passing under the unblinking monocle of that looming Mercedes star. On the GP circuit's tight corners, the differences in the prototype would be apparent even to someone who drives mining trucks for a living. With the rear wheels brought to life, the wide SV turns more eagerly and is easier to adjust midcorner, letting you trace a very fine scalpel line. The massive sled of a car shrinks around you. The regular SV is no airport



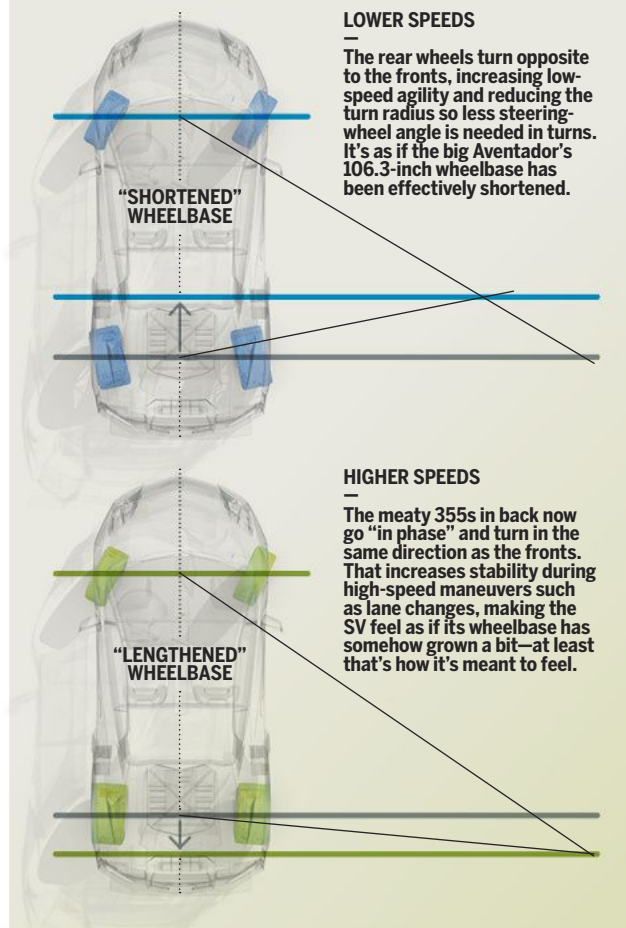
bus, but it wears more like a nicely tailored jacket and slacks compared with the prototype, which is a wetsuit. Throttle, brake, turn, throttle, brake, turn; the writhing GP circuit is a workout, but the prototype's slithery tush means it wants to dive-bomb the apex cones. For anyone who knows Lamborghini, who knows what a dry-lake-bed rod the Diablo drove like, the bull has come a long way.

As with most four-wheel-steering systems, the Lambo's rear wheels turn in the opposite direction of the fronts at low speed, creating a "virtual shorter wheelbase," says vehicle dynamics engineer Giuseppe Di Rosa, for a reduced turn radius and more agility in tight corners. At higher speeds, meaning above 60 mph, the wheels go in phase with the fronts, creating, in effect, a longer wheelbase for stability. After a few sessions on the GP circuit, we leap out, singing the praises of the prototype to our beaming hosts.

The murky skies descend a bit. After lunch we take a ride around the GP circuit with a blond, falcon-eyed Dutch racer named Jeroen Mul in a Huracán Super Trofeo from the company's one-make series, nearly losing our gnocchi to the belt-straining brakes. After that, Lamborghini deems us all ready for the big show, for the



Explained: Rear steering and "virtual" wheelbase



Grüne Hölle. So along with the Accademia students, we troop over to the incomparable Nordschleife, a zillion-dollar conga line of Aventadors and Huracáns rendered in all the blazing colors of the Skittle-verse.

The first lap through the forest takes time as we warm up the tires and the nerves and avoid passing the jittery school groups. In places, the track is desert dry; in others, it's damp. Such is the 'Ring with its varying patchwork of weather. We stop in the pits and I wave off an inquiring Fasanetto, who has been showing us the line and wants to see if we wish to swap cars. Nope, not yet.

The prototype SV does all the Nürburgring things, going terrifyingly light at the Flugplatz, crashing into the lumpy Caracciola-Karussell, and attacking the curbing in the highly technical section from Wippermann down to the Schwalbenschwanz, the Swallow's Tail. At 8000 revs, ears are flattened and eyes see stars. And those flames! On the straight, gearchanges banging in one after the other, the SV simply flies, the speedo creeping just past 300 km/h (186 mph) as the gentlest of kinks at Tiergarten comes up so fast that it feels like... like—wait, something's wrong.

The newfound slash that the prototype displays on the tight GP circuit emerges as a nervous hyperactivity on the faster Nordschleife. We swap cars, then swap again, confirming impressions. Yes, the regular SV is more secure, more planted, less work, less white-knuckled at the triple-digit Tiergarten and elsewhere. Feeling more confident, we drive harder in the regular SV. Upon retiring to the pits, we deliver our observations and the engineers nod; apparently this is not news and there's still work to do. Enlivening the rear with steering and new geometry comes with trade-offs, and, as with everything in automotive engineering, the art is in finding the best compromise.

Lamborghini is coy on when we'll see rear steering in something besides the Centenario, allowing only that it's been working on it for two years. That's a lot of laps at the 'Ring, and there are more to come. If they're looking for volunteers, we're in, even if it takes another 10 years. ■

LAMBORGHINI AVENTADOR SV PROTOTYPE

VEHICLE TYPE: mid-engine, all-wheel-drive, 2-passenger, 2-door coupe
BASE PRICE: \$500,000 (est)
ENGINE TYPE: DOHC 48-valve V-12, aluminum block and heads, port fuel injection
DISPLACEMENT: 397 cu in, 6498 cc
POWER: 740 hp @ 8400 rpm
TORQUE: 509 lb-ft @ 5500 rpm
TRANSMISSION: 7-speed automated manual
DIMENSIONS
WHEELBASE: 106.3 in
LENGTH: 190.4 in
WIDTH: 79.9 in
HEIGHT: 44.7 in
PASSENGER VOLUME: 50 cu ft
TRUNK VOLUME: 5 cu ft
CURB WEIGHT: 3900 lb
PERFORMANCE (C/D EST)
ZERO TO 60 MPH: 2.7 sec
ZERO TO 100 MPH: 5.9 sec
1/4-MILE: 10.5 sec
TOP SPEED: 217 mph
FUEL ECONOMY (C/D EST)
EPA COMBINED/CITY/HWY: 13/11/18 mpg

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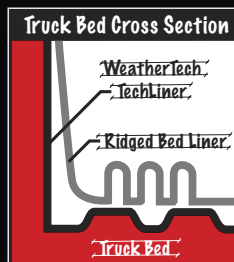
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mellow sounds of yesteryear.

_by Tony Quiroga
_photography by Sean C. Rice



A silver Mercedes-AMG S63 Cabriolet is driving on a road, with a blurred background of greenery and a bright light source in the upper left. The car is shown from a front-three-quarter view, moving towards the left. The background is heavily blurred to convey a sense of high speed. The car's headlights are on, and its distinctive grille and wheels are clearly visible.

MERCEDES-AMG S63 CABRIOLET

Price: \$214,525 • Power: 577 hp
Torque: 664 lb-ft • Weight: 4929 lb
C/D observed: 14 mpg

A dark-colored Bentley Continental GT V-8 S Convertible is driving on a road, with a blurred background of greenery and a bright light source in the upper left. The car is shown from a front-three-quarter view, moving towards the left. The background is heavily blurred to convey a sense of high speed. The car's headlights are on, and its distinctive grille and wheels are clearly visible.

**BENTLEY CONTINENTAL GT
V-8 S CONVERTIBLE**

Price: \$272,995 • Power: 520 hp
Torque: 502 lb-ft • Weight: 5572 lb
C/D observed: 16 mpg

d

ad bought a new Cadillac Eldorado convertible in 1976. GM touted it as the last of the big droptops, a majestic parting shot seemingly designed to transport prom queens, grand marshals, and Boss Hogg types into an increasingly dystopian, gas-rationed future. Dressed in triple red with every option, including

fuel injection, automatic high-beams, power everything, and a hard tonneau “parade boot,” that 18.7-foot luxu-barge weighed 5231 pounds and was motivated via an 8.2-liter V-8 under a hood so long you could land an Airbus A380 on it. No one can say that Cadillac let the convertible go gently into that good night.

What no one could have imagined back in 1976 was that big convertibles would exist at all 40 years later, much less as 500-plus-hp chariots for the same well-to-do neighborhoods that Cadillac once owned. In a world of \$2.50 gas and ever-growing stock portfolios, the parade car has returned. Using a big, thirsty, open-air sled to declare “I’m rich and deserve this” is again possible without having to resort to the classic-car market.

After a four-decade hiatus, Mercedes is back to building full-size convertibles. Save your letters; we’re not counting the E-class-based 1993–95 cabriolet because it did not achieve true pulchritude. In no dimension, except maybe build quality, does it measure up to this S-class-derived four-seater. Available in three flavors, Merc’s convertible is a leather-packed bullet aimed squarely at the Bentley Continental GT convertible. Constant updates have kept the now 12-year-old Continental as relevant as any car costing more than \$200 large can credibly be.

Admittedly, when conducting a comparison of cars this ludicrously expensive, logic is trumped by baser stuff. Cadillac certainly wasn’t thinking logically when it built its 8.2-liter V-8. Just as with old stars that grow so large they collapse upon themselves, Cadillac’s 500-cubic-inch supergiant, in its final year, made just 190 horsepower (215 with fuel injection) and 360 pound-feet of torque, numbers that Mercedes can now match with a 2.1-liter turbo-diesel. But with two turbochargers and more than 500 horsepower each, these modern V-8s certainly recall that Cadillac’s excess.

Bentley and Mercedes do offer larger 12-cylinder engines, but we chose the V-8 versions because upping the cylinder count adds weight, complexity, and cost without, in our opinion, improving the driving experience. Okay, so sometimes logic does trump emotion, even in the illogical world of the big convertible.

On the Mercedes side, we selected the 577-hp AMG S63 that starts at \$178,325, here to do battle with the 520-hp Continental GT V-8 S convertible that opens at \$234,525. AMG’s 5.5-liter blown V-8 is the perfect foil to Bentley’s 4.0-liter blown V-8. Because it’s not exactly Bentley’s engine—it’s the same unit found in a number of Audis—this is sort of a proxy war between two German rivals.

Cloth-top, two-door personal luxury machines might perplex those of us without vacation homes and yachts, but as with the Eldorado of the ’70s, there’s a seductive magic to a comfortable, tech-filled premium convertible with a V-8 heart.

2017 BENTLEY CONTINENTAL GT V-8 S CONVERTIBLE

\$272,995

PRICE AS TESTED
BASE PRICE

\$234,525

2017 MERCEDES-AMG S63 CABRIOLET

\$214,525

PRICE AS TESTED
BASE PRICE

\$178,325

DIMENSIONS

LENGTH	189.2 in	198.6 in
WIDTH	76.5 in	75.2 in
HEIGHT	55.2 in	56.2 in
WHEELBASE	108.1 in	115.9 in
FRONT TRACK	65.5 in	64.7 in
REAR TRACK	65.2 in	64.9 in
INTERIOR VOLUME	F: 55 cu ft* R: 31 cu ft*	F: 53 cu ft* R: 35 cu ft*
TRUNK, TOP UP/DOWN	9/9 cu ft	12/9 cu ft

POWERTRAIN

ENGINE	twin-turbocharged DOHC 32-valve V-8 244 cu in (3993 cc)	twin-turbocharged DOHC 32-valve V-8 333 cu in (5461 cc)
POWER HP @ RPM	520 @ 6000	577 @ 5500
TORQUE LB-FT @ RPM	502 @ 1700	664 @ 2250
REDLINE/FUEL CUTOFF LB PER HP	6250/6400 rpm 10.7	6500/6250 rpm 8.5

DRIVELINE

TRANSMISSION	8-speed automatic all	7-speed automatic all
DRIVEN WHEELS	all	all
GEAR RATIO:1/MPH PER 1000 RPM/MAX MPH	1 4.71/6.1/39 2 3.14/9.2/58 3 2.10/13.8/88 4 1.67/17.3/110 5 1.29/22.4/142 6 1.00/28.9/184 7 0.84/34.4/191 8 0.67/43.1/191	1 4.38/6.9/43 2 2.86/10.6/66 3 1.92/15.8/99 4 1.37/22.2/139 5 1.00/30.4/186 6 0.82/37.0/186 7 0.73/41.6/186
AXLE RATIO:1	2.85	2.65

CHASSIS

SUSPENSION	F: multilink, air springs, anti-roll bar R: multilink, air springs, anti-roll bar	F: multilink, air springs, anti-roll bar R: multilink, air springs, anti-roll bar
BRAKES	F: 15.9-inch vented disc R: 13.2-inch vented disc	F: 15.4-inch vented, cross-drilled disc R: 14.2-inch vented, cross-drilled disc
STABILITY CONTROL	fully defeatable, competition mode	fully defeatable
TIRES	Pirelli P Zero 275/35ZR-21 (103Y)	Michelin Pilot Sport 3 F: 255/40ZR-20 (101Y) R: 285/35ZR-20 (104Y)

CAR AND DRIVER TEST RESULTS

ACCELERATION

0–30 MPH	1.6 sec	1.6 sec
0–60 MPH	4.3 sec	3.7 sec
0–100 MPH	10.5 sec	8.7 sec
0–150 MPH	27.1 sec	22.1 sec
1/4-MILE @ MPH	12.8 sec @ 111	12.1 sec @ 117
ROLLING START, 5–60 MPH	5.0 sec	4.5 sec
TOP GEAR, 30–50 MPH	2.6 sec	2.5 sec
TOP GEAR, 50–70 MPH	3.4 sec	2.7 sec
TOP SPEED	191 mph (mfr’s claim)	186 mph (mfr’s claim)

CHASSIS

BRAKING, 70–0 MPH	166 ft	168 ft
ROADHOLDING, 300-FT-DIA SKIDPAD	0.81 g	0.89 g

WEIGHT

CURB	5572 lb	4929 lb
%FRONT/%REAR	55.4/44.6	53.2/46.8

FUEL

TANK RATING	23.8 gal 91 octane	24.3 gal 91 octane
EPA COMBINED/CITY/HWY	17/14/24 mpg	17/14/22 mpg
C/D 300-MILE TRIP	16 mpg	14 mpg

CONVERTIBLE TOP

TIME TO OPEN/CLOSE	20/22 sec	20/18 sec
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SOUND LEVEL

IDLE	48 dBA	42 dBA
FULL THROTTLE	83 dBA	78 dBA
70-MPH CRUISE	65 dBA	63 dBA



2. Mercedes-AMG S63 cabriolet

It's easy to forget that the S63 ragtop offers 577 horsepower and the ability to leap to 60 mph in 3.7 seconds. It ably performs feats of strength, but this big AMG, from its quiet performance to the caressing fingers of its massaging seats, lulls you into an effortlessly comfortable and nearly perfectly bored state. Maybe that's why Mercedes included Attention Assist here.

We found our attention fading because the S63 doesn't seem to want or need our involvement. It's a hugely complex and sophisticated machine full of electronics and driver aids that are always on alert and ready to take over. Meticulous engineering has taken this car to the precipice of autonomy. It seems to be saying: "I heard what Dr. McIntyre told you about your PSA score. I wouldn't worry. Just sit back and enjoy a massage. Classic or hot stone?"

Participate in driving and you'll quickly become annoyed with the seven-speed automatic. In place of a torque converter, this planetary gearbox has a multiplate startup clutch bathed in fluid. The clutch is slow to engage when accelerating from a stop, and the car jerks and bucks in stop-and-go traffic. Unlike other AMGs with this transmission, there's no launch control, so we have to wonder why they bothered. Not that you really need launch control with this much power.

Steering is light and creamy, but we'd like it to be a bit more tactile. Bend it into a corner and the S63 remains flat and poised all the way up to its 0.89-g limit. When forcefully engaged, there's

a great chassis here and the AMG hustles when pushed, but the agility is buried down in the basement under 4929 pounds of steel, glass, and leather.

Two big flat-panel displays dominate an instrument panel that executive editor Aaron Robinson called the "dashboard by Best Buy." Benz's electronic gauges beautifully mimic analog dials, and selecting the AMG display adds oil- and transmission-temperature dials, but the entire panel is set too high and the small-diameter steering wheel partially obscures the dials

Mercedes-AMG S63 cabriolet
[+] A V-8 that thinks it's a 12, supernatural chassis.
[-] Transmission jerks, is that the new C-class?
[=] I am robot, hear me roar.





1. Bentley Continental GT V-8 S convertible

Back in 2004, a Continental GT finished last in a comparison test against a Ferrari 612, an Aston Martin DB9, and a Mercedes-Benz CL600. Running in that group, the Continental felt like a whale among sharks. Since then, cars have continued to get heavier and more complex while the Continental has enjoyed a steady stream of enhancements that have transformed it from a krill eater to a seal killer.

Of the many changes over this orca's life cycle, perhaps the most dramatic is the addition of Audi's 4.0-liter V-8. Without the twin-turbo W-12 anchor weighing down the Continental's front end, the hard-top and the convertible Contis were transformed into relatively lighter and livelier machines. The convertible's skidpad grip is a lackluster 0.81 g, yet the Bentley never wants for grip on the road and has no trouble staying glued to the S63's rear bumper.

With 55.4 percent of its 5572 pounds on the nose, the Continental is nowhere near as balanced as the AMG. But the steering reacts to the front Pirelli P Zero tires' torture with clear and natural feedback, the

The S63's racy getup is inconsistent with its driving character. It's akin to painting Boss Hogg's Caddy orange and affixing "01" stickers to its doors.

unless you raise the wheel to an awkward height. If you're going to substitute instruments for an iPad, at least make it so that the display can be moved or configured in a number of ways. Benz doesn't, so it might as well have stuck with more-sporting analog gauges.

There's a lot to love about the rest of the interior. Bengal-red-and-black leather costs an extra \$3250 and wraps nearly every bit of the cabin. Carbon-fiber and black-lacquer-wood trim, a \$3700 option, fills in the remaining gaps. At 70 mph, only 63 decibels find their way through the thickly padded top, which makes the S63 the perfect place to hear every one of the 1540-watt Burmester audio system's 24 speakers. It's possible that this car's older clientele will only listen to AM radio over this spectacular \$6400 system. Not to worry; Rush, either the man or the band, comes through loud and clear.

A faint quiver through the structure is the only hint of its missing roof, or that this car is in some small way technically fallible. At greater fault is the car's personality: Its demeanor keeps you at arm's length, Mercedes having refined this convertible to the point of joylessness. It's a sad thing to say about a company that once filled this niche in the late '60s and early '70s with the W111 280SE—the steel, chrome, and leather equivalent of Grace Kelly.

kind cars enjoyed before electric power-steering assist became the norm. As with Bentleys of yore, the Continental glides along with the relentless inertia of a steam train, even at 150 mph.

Audi, er, Bentley offers two versions of its twin-turbo 4.0-liter V-8. In the S version, it makes 520 horsepower and 502 pound-feet of torque; lesser versions subsist on a mere 500 horsepower and 487 pound-feet. Even with the S tune under the hood, Bentley's GT can't match the acceleration of the 643-pound-lighter S63. A run to 60 mph takes 4.3 seconds, and the quarter-mile passes in 12.8 seconds at 111 mph. Acceleration lags behind the AMG's, but the timbre of the Bentley's V-8 playing through the \$2580 "Sports Exhaust" is warmer and more honeyed than the AMG's metallic rasp.

On the street, the Bentley's old-school conventional eight-speed automatic switches gears undetected and pulls away from a



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Bentley Continental GT V-8 S convertible **[+]** Refreshingly smooth, that burble, life before the robot invasion. **[-]** Too heavy for our scales, not much grip, not quite as quick as the AMG. **[=]** Looks, personality, and leather.

stop with fluid ease. In any mode other than the hardest setting, the air suspension is graceful and unperturbed by impacts encountered by the 21-inch wheels. Other cars have aped some of the Bentley's design language, but so what? It still looks like what it is, while the AMG from one too many angles looks like an elongated C-class ragtop.

In the grand Bentley tradition, the interior is lined with soft and perfectly matched hides that are as redolent as they are flawless. Bentleys don't really have that new-car smell so much as that new Louis Vuitton-wallet smell. Tamo Ash veneers, a \$1360 upcharge, are stained a yellowish hue that matches the cream-colored Magnolia leather. Gray accent leather on the doors and the top of the instrument panel is called Porpoise, but, like the other hides, it comes from land animals and not sea creatures.

Drive both back to back and it's apparent that the Bentley is interested in taking care of you rather than taking care of everything. Despite its age, the Bentley delivers a richer and more luxurious experience commensurate with its ridiculous \$272,995 price. But what really matters to us is that it's the better car to drive. ■

After 12 years on the market, the GT is more competitive than when it was introduced. Quiroga attempts to offset load transfer with his head.

FINAL RESULTS

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The Official Fuel of
CAR AND DRIVER

Mercedes-AMG S63 Cabriolet
Bentley Continental GT V-8 S
Maximum points available

RANK

1

2

VEHICLE

DRIVER COMFORT	10	10	9
ERGONOMICS	10	9	8
REAR-SEAT COMFORT	5	5	5
REAR-SEAT SPACE*	5	4	5
TRUNK SPACE*	5	4	5
FEATURES/AMENITIES*	10	7	10
FIT AND FINISH	10	10	9
INTERIOR STYLING	10	9	8
EXTERIOR STYLING	10	9	6
REBATES/EXTRAS*	5	0	0
AS-TESTED PRICE*	20	15	20
SUBTOTAL	100	82	85

POWERTRAIN

1/4-MILE			
ACCELERATION*	20	17	20
FLEXIBILITY*	5	3	3
FUEL ECONOMY*	10	10	8
ENGINE NVH	10	10	9
TRANSMISSION	10	10	6
SUBTOTAL	55	50	46

CHASSIS

PERFORMANCE*	20	18	20
STEERING FEEL	10	9	8
BRAKE FEEL	10	7	9
HANDLING	10	9	10
RIDE	10	10	8
SUBTOTAL	60	53	55

EXPERIENCE

FUN TO DRIVE	25	21	18
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TOTAL

240	206	204
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*These objective scores are calculated from the vehicle's dimensions, capacities, rebates and extras, and/or test results.



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SKINNY LEGS



AND ALL

A quick tryst with the new Boxster S reveals that even though it packs a smaller engine and an unattractive voice, it's still worthy of love. _by Don Sherman

· 2017 Porsche 718 Boxster S

_photography by Marc Urbano





Cue the pipers and turn your hymnals to “Amazing Grace.”

This is where we mourn the demise of one of our all-time favorite engines, Porsche’s naturally aspirated flat-six. The final nails are being hammered into its coffin as Porsche powers all 2017 911s with twin-turbo sixes, and the cylinder count gets whacked from six to four throughout the 2017 718 Boxster and Cayman lineup.

Chalk up this move to the relentless quest for efficiency. Replacing cylinders and cubic inches with turbos is now a favorite power-train strategy because, shrewdly done, power and performance can be maintained or even improved while paying the EPA piper. Unfortunately, the side effects can be tragic. The tenor wail of a free-breathing boxer-six belting out a Puccini aria on the way to its 7800-rpm redline is hereby canceled. And the throttle response is lackadaisical. When fresh turbos battled classic warriors in our June issue [“To Blow or Not to Blow?”], the naturally aspirated platoon won three of the four skirmishes.

So, it was with some trepidation that we welcomed the Porsche 718 Boxster S for a couple of weeks of driving and an attendant trip

to the test track. Knowing this is a pivotal moment in the life of a car that’s graced our 10Best list 17 times since 1998, Porsche provided a unit armed with all but one performance-enhancing option plus a few furbelows.

The 718 series is a thorough facelift of the third-generation Boxster introduced four years ago. Basic dimensions such as the 97.4-inch wheelbase and bits such as the luggage-compartment lids, convertible top, and windshield carry over, but the exterior is freshly muscled up with hungry side scoops, broader bumpers, and revised head- and taillamp designs. Significant upgrades to the steering, suspension, and brakes are also part of the deal. Inside, there’s a new dash with a 7.0-inch touchscreen, a 110-watt sound system, and comprehensive infotainment options. The 718 tag recalls the Rennsport department’s late ’50s and early ’60s successes with boxer-fours in endurance races, hill-climbs, and Formulas both 1 and 2.

Of course, that was ages before Porsche bestowed the first 911 Turbo on wide-eyed enthusiasts. While that magic bag of turbo lag is also a permanent resident on our all-time favorites list, four decades of dyno and track sweat have largely dealt with that demon, thrusting the 718 Boxster S into the modern sports-car maelstrom with 350 very accessible horsepower and a potent 309 pound-feet of torque starting at only 1900 rpm.

Before we divulge the performance stats you’re dying to know, let us share the annoyance experienced by a few staff members when this new vintage was first uncorked. There is idle ticking reminiscent of the original Volkswagen Beetle, and

The old car’s glorious engine note has been replaced by incessant growling, but the Boxster’s transcendental chassis and exquisite steering remain.

some of us detect nuances of Subaru in the Boxster S's aural bouquet. While most of us are prone to expeditiously pitch the new soundtrack into our wake, some here verge on tears over Porsche's move from a six-cylinder sweetheart to what they regard as a turbo-four scoundrel.

Wearing a base price of \$69,450 and 18 optional upgrades, our test car crowded six figures. (For reference, this \$94,660 Boxster S costs \$4210 more than a base 911 coupe armed with two more cylinders and a second turbo.) The expensive items are: 18-way sport seats (\$3465), a full leather interior (\$2950), sport exhaust (\$2540), PASM electronic dampers accompanied by a ride height dropped by 0.8 inch (\$2070), the Sport Chrono package (\$1920), navigation (\$1730), 20-inch wheels (\$1580), and brake-based torque-vectoring logic (\$1320).

Baked into the new base price are several upgrades Porsche added to the 718 Boxster/Cayman to deflect your thoughts from the engine revolution. A dual-mass flywheel, more sound deadening, and a speaker piping in engine noise soften the turbo four's edginess. A rack-and-pinion gear borrowed from the 911 Turbo quickens the off-center steering ratio by 10 percent. The wider front brake rotors are squeezed by four-piston calipers, also handed down from the 911. New Pirelli P Zero tires on wider rear wheels bring, according to Porsche, better braking grip with lower rolling resistance.

Dyno plots depict the Boxster S's new 2.5-liter flat-four in a highly favorable light. Maximum rpm is 7500 rpm, down by only 300. The new torque curve jumps quickly from idle to a 309-pound-foot plateau stretching from 1900 to 4500 rpm, sustained by 14.5 psi of boost. Compare that with the previous 3.4-liter engine's torque curve, which dropped into a deep valley from 2500 to 4500 rpm, attributable to induction tuning optimized for the mid-range. Using resonance effects instead of forced induction imposes sacrifices at some point in the rpm spectrum to achieve significant gains elsewhere.



[+] Magnificent handling, open-air vitality, tidy package.
[-] No mileage gain in spite of the cylinder sacrifice.
[=] An imperfect Boxster that remains nearly perfect.

The problem with dyno derbies is they ignore transient activities, such as nailing the throttle at idle to accelerate from a stoplight. Porsche addresses that concern with miniature pivoting vanes built into the turbo housing that direct the weak low-rpm exhaust stream to the periphery of the turbine wheel to get it spinning then re-aim flow toward the housing's exit to minimize restriction at high rpm.

Another clever trick avoids stalling the turbo when the driver lifts off the gas to slow for a bend. Instead of closing the throttle to trim airflow, Porsche interrupts fuel delivery. This keeps the booster wheels spinning to minimize lag when the driver dips back into the throttle.

That theory is great, but what happens at the test track and while you're stalking Chevy Corvettes on the street is what really matters. Problem one is launching a car that has excellent traction with software that limits revs to 4500 rpm when the clutch is disengaged. (While launch control is available in PDK-equipped Boxster Ss, stick drivers must fend for themselves.) Following a quick chirp, the engine bogs and the wheelspin needed to hustle you up the rpm range never happens.

The second issue is weight: The gain over the previous Boxster S is 30 to 90 pounds, depending on the option load. That's why our zero-to-60-mpg time drops by a mere 0.1 second, from 4.4 to 4.3 seconds, versus the Boxster S we tested four years ago. The gap grows to 0.3 second by the end of the quarter-mile, however, where the new edition ran 12.6 seconds at 113 mph versus the 2013 Boxster S's 12.9 seconds at 111 mph.





Top-gear passing acceleration peels another slice from the onion. With minimal rpm and boost on tap, the new S takes a comparative forever, or 7.8 seconds, to climb from 30 to 50 mph, 0.3 second longer than before. At least the new S beats the old one in the 50-to-70-mph hustle, with a 5.7-second run versus 6.4 seconds for the 2013 model.

Bottom line: This new S is barely quicker than the previous version, and you must work the machine and its various drive modes smartly to make sure boost is available before playing your acceleration card. Included with the expensive Sport Chrono package, in addition to cool lap-timing gear, is a drive-mode switch borrowed from the 918 Spyder and attached to the steering wheel.

Above: This man is getting slightly worse fuel economy than he would have in last year's Boxster S. He is entirely unconcerned by this reality.

and Porsche's best production platform handles like a single-seater on a busman's holiday.

This Boxster's convertibility is also tough to beat. The top rises and falls in 10 seconds, up to 43 mph, at the touch of a toggle. The forward top section serves as the folded roof's cover. Thanks to

It sharpens engine reflexes in the more aggressive sport and sport-plus settings. Sport mode also jams snap, crackle, and pop down the pipes on overrun.

It gets better: The brake and tire upgrades clip three feet off the already impressive 70-to-zero stopping distance, which is 144 feet, or five feet shorter than a Jaguar F-type S's. The pedal feel and modulation are superb, as before. We also logged a significant improvement in cornering grip, from 0.99 g before to an eye-ball-warping 1.04 g's in the new S. Fresh calibrations for the adaptive dampers, brake-based torque vectoring, and stability-management system yield a sports car with unmatched back-road agility. There's no hint of body dive or roll, turn-in is crisp,

2017 PORSCHE 718 BOXSTER S

PRICE
AS TESTED **\$94,660**
BASE \$69,450

VEHICLE TYPE: mid-engine, rear-wheel-drive, 2-passenger, 2-door convertible
OPTIONS: 18-way adaptive sport seats plus with memory package, \$3465; Bordeaux Red leather interior, \$2950; sport exhaust, \$2890; PASM sport suspension, \$2070; Sport Chrono package, \$1920; navigation, \$1730; 20-inch Carrera S wheels, \$1580; torque vectoring, \$1320; Porsche Connect Plus, \$1300; wheels painted in Platinum Satin, \$1085; brushed-aluminum interior package, \$895; two-zone automatic climate control, \$760; ventilated seats, \$730; auto-dimming mirrors, \$690; painted roll bars, \$635; heated seats, \$530; light design package, \$340; GT sport steering wheel, \$320; red top, \$0; luggage net in passenger footwell, \$0; smoking package, \$0; 718 model designation, \$0; amber side markers, \$0
AUDIO SYSTEM: satellite radio, CD player, 10-GB media storage; minijack, USB, and Bluetooth-audio inputs; Apple CarPlay interface; 6 speakers

ENGINE
turbocharged and intercooled flat-4, aluminum block and heads
BORE X STROKE 4.02 x 3.01 in, 102.0 x 76.4 mm
DISPLACEMENT 152 cu in, 2497 cc
COMPRESSION RATIO 9.5:1
FUEL DELIVERY SYSTEM: direct injection
TURBOCHARGER BorgWarner
MAXIMUM BOOST PRESSURE 14.5 psi

VALVE GEAR: double overhead cams, 4 valves per cylinder, variable intake- and exhaust-valve timing and lift
REDLINE/FUEL CUTOFF 7400/7500 rpm
POWER 350 hp @ 6500 rpm
TORQUE 309 lb-ft @ 1900 rpm

DRIVETRAIN
TRANSMISSION: 6-speed manual
FINAL-DRIVE RATIO: 3.89:1, clutch-type limited-slip

GEAR	RATIO	MPH PER 1000 RPM	MAX SPEED IN GEAR (rpm)
1	3.31	6.3	47 mph (7500)
2	1.95	10.7	80 mph (7500)
3	1.41	14.8	111 mph (7500)
4	1.13	18.5	139 mph (7500)
5	0.95	22.0	165 mph (7500)
6	0.81	25.8	177 mph (6850)

CHASSIS
unit construction
BODY MATERIAL: steel and aluminum stampings

STEERING
rack-and-pinion with variable ratio and variable electric power assist
RATIO 15.0-12.4:1
TURNS LOCK-TO-LOCK 2.5
TURNING CIRCLE CURB-TO-CURB 36.0 ft

SUSPENSION
F: ind, strut located by 1 diagonal link and 1 lateral link per side, coil springs, 3-position electronically controlled dampers, anti-roll bar
R: ind; strut located by 1 trailing link, 1 lateral link, and a toe-control link per side; coil springs; 3-position electronically controlled dampers; anti-roll bar

BRAKES
F: 13.0 x 1.3-in vented, cross-drilled disc; 4-piston fixed caliper
R: 11.8 x 0.8-in vented, cross-drilled disc; 4-piston fixed caliper

STABILITY CONTROL: fully defeatable, competition mode

WHEELS AND TIRES
WHEEL SIZE F: 8.0 x 20 in R: 10.0 x 20 in
WHEEL CONSTRUCTION forged aluminum
TIRES: Pirelli P Zero F: 235/35ZR-20 (88Y) R: 265/35ZR-20 (95Y)

EXTERIOR DIMENSIONS
WHEELBASE 97.4 in
LENGTH 172.4 in
WIDTH 70.9 in
HEIGHT 50.4 in
FRONT TRACK 59.7 in
REAR TRACK 60.6 in
GROUND CLEARANCE 4.5 in

INTERIOR DIMENSIONS
SAE VOLUME 49 cu ft
TRUNK 5/4 cu ft (front/rear)

CAR AND DRIVER TEST RESULTS

ACCELERATION	SECONDS
ZERO TO 10	
30 MPH	1.7
40 MPH	2.3
50 MPH	3.4
60 MPH	4.3
70 MPH	5.3
80 MPH	6.8
90 MPH	8.2
100 MPH	9.8
110 MPH	12.0
120 MPH	14.1
130 MPH	16.7

effective aero tuning and the mesh panel spanning the roll-over hoops, you can sunbathe at 100 mph with minimal turbulence.

Swing-out cupholders are a smart alternative to console receptacles. The only things lacking in this cockpit are a handy place to stash your cellphone and some means of seeing the engine without employing a hoist.

One facet of the new Boxster remains an enigma, though. The whole point of the smaller turbo engine is improved gas mileage. Unfortunately, something failed to click, resulting in a loss of 1 mpg in the EPA highway rating (to 26 mpg) and no gain in the city test. Our observed mileage also dropped 1 mpg, to 18 mpg overall.

The VW Group's Dieselgate dilemma may be behind the disappointing EPA mileage ratings. By certifying the Boxsters with conservative mpg figures, Porsche lessens the chance the feds will subject its paperwork to close scrutiny. Take solace in the 30 mpg we logged while cruising at 75 mph on the highway.

The politics fade to insignificance when the sun shines and the traffic evaporates on your favorite back road. Even though Porsche played Frankenstein with the Boxster's soul, we still love it. It remains one of the best sports cars (just) less than \$100K will buy. ■

140 MPH	20.8
150 MPH	25.0
160 MPH	32.0
ROLLING START, 5-60 MPH	5.3
TOP GEAR, 30-50 MPH	7.8
TOP GEAR, 50-70 MPH	5.7
1/4-MILE	12.6 sec @ 113 mph
TOP SPEED	177 mph (drag ltd, mfr's claim)

HANDLING

ROADHOLDING, 300-FT-DIA SKIDPAD	1.04 g
UNDERSTEER	Minimal

BRAKING, 70-TO-ZERO MPH

SHORTEST STOP	144 ft
LONGEST STOP	149 ft
FADE RATING	None

WEIGHT

CURB	3122 lb
PER HORSEPOWER	8.9 lb
DISTRIBUTION	F: 45.5% R: 54.5%
CENTER-OF-GRAVITY HEIGHT	20.0 in
TOWING CAPACITY	0 lb

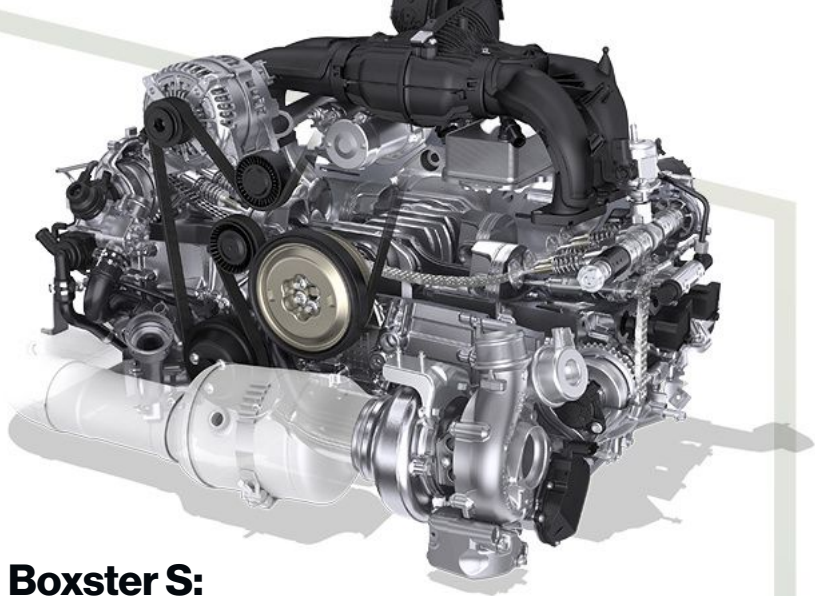
FUEL

CAPACITY	16.9 gal
OCTANE	93 (recommended)
EPA COMBINED/CITY/HWY	22/20/26 mpg
C/D OBSERVED	18 mpg

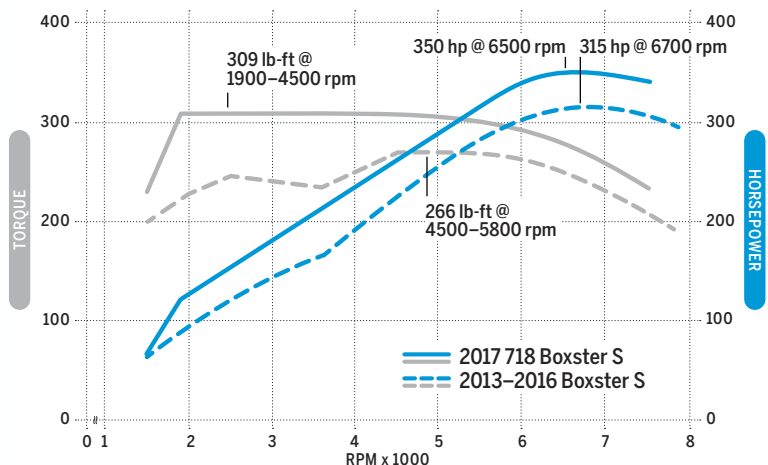
INTERIOR SOUND LEVEL

IDLE	54 dBA
FULL THROTTLE	88 dBA
70-MPH CRUISING	75 dBA

Shell
V-Power
NITRO+
Premium Gasoline
The Official Fuel of
CAR AND DRIVER



Boxster S: Power and Torque

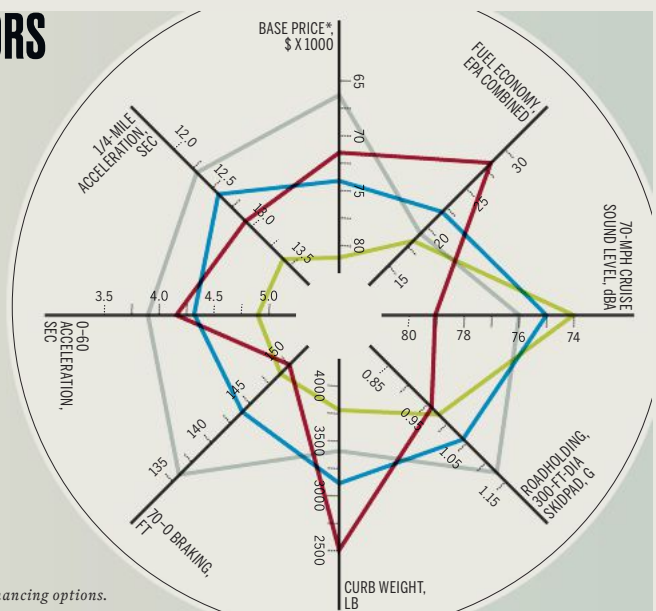


Thanks to 14.5 psi of turbo boost, Porsche's new 2.5-liter flat-four produces 11 percent more power and 16 percent more torque than the outgoing 3.4-liter naturally aspirated flat-six. The six's torque roller coaster gets replaced by a meaty plateau—a torque Bolognese, if you will—from 1900 to 4500 rpm. One casualty: 300 rpm lost at the high end.

COMPETITORS

As always, the Corvette owns the intersection of performance and value. The 718's virtues are easier quantified with words than numbers.

- ALFA ROMEO 4C SPIDER
- 1.7-L I-4, 6-SP AUTO
- CHEVROLET CORVETTE GRAND SPORT
- 6.2-L V-8, 7-SP MAN
- JAGUAR F-TYPE S
- 3.0-L V-6, 6-SP MAN
- PORSCHE 718 BOXSTER S
- 2.5-L FLAT-4, 6-SP MAN



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Pickups, Crossover Vehicles and SUVs



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Studless Ice & Snow

Coupes, Sedans, Minivans and Crossovers



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Performance Winter / Snow

Sports Cars, Sporty Coupes and Performance Sedans

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15 16 17 18

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Four unprepared ridden \$1500 Three grueling days and pavement. **The Battle of the**

1990 GEO TRACKER

Price: \$1200
Owner profile: Big Johnson
T-shirt enthusiast
Favorite food: McRib
Spirit animal: Barbie



1988 JEEP CHEROKEE

Price: \$800
Owner profile: Public urinator
Favorite food: Doral Lights
Spirit animal: Roadkill

1979 FORD F-150 CUSTOM

Price: \$1500
Owner profile: LARPer
Favorite food: Bison jerky
Spirit animal: Lou Ferrigno

teams. Four disease- vehicles. of mud, sand, It must be ... **Off-Road Beaters**

2004 LAND ROVER DISCOVERY

Price: \$1500

Owner profile: Dilettante

Favorite food: Pumpkin spice

Spirit animal: Labradoodle

Until you've realized that the phone in your pocket is still connected via Bluetooth to the car your co-worker just started outside your office window, which means *he* is now listening to Shakira's *Oral Fixation, Vol. 2*, and the infotainment display is outing the music as yours, well, you can't know the struggles we endure here at 1585 Eisenhower Place. It's hard driving new cars all the time; sometimes you just gotta go for a run in a turd.

_by Jared Gall _photography by Roy Ritchie and Marc Urbano



That's more or less how we decided the time had come for another beater challenge. Past such budget-burners have featured ice racing, a sort of street-car Olympics, and a cross-country scavenger hunt. For this installment, we decided to buy old 4x4s and fix them up so we could break them again. Pairs of editors were given \$1500 budgets, which they promptly blew, and we devised a series of off-road abuses. The scoring was, to put it mildly, improvised.

Reviews editor Josh Jacquot and your author immediately dismissed rationality. "We could buy a pretty nice Cherokee for \$1500," Jacquot observed, "but that'd be like buying a Camry."

Agreeing that insanity was the surest path to victory, we found a '79 Ford F-150 missing the bed, fenders, and hood. The hood was not actually missing, but the seller wanted to keep it because he was using it as a sled to pull his kids around behind a snowmobile. Our test drive suggested that gravity and friction were standing in for threaded fasteners, as no part of the truck seemed to be securely attached to any other. But it rode on 44-inch tires and looked like a *Mad Max* prop, so we towed it home \$1500 poorer and fully agreed that we had already won.

Triumphantly, we parked it in front of the office. As our co-workers debated how comfortable they were even standing near it, deputy editor Daniel Pund and I climbed aboard for a joyride. The Ford stalled 12 feet later, refused to restart, and wouldn't take a jump. As we pushed it back into its parking space, the power-steering pump puked its fluid. Lucky for us, our landlord likes oil stains. At least, we hope he does, because he now has a panoply.

With more rock-crawling and dune-running experience than the rest of us combined, road-test editor Chris Benn and senior online editor Mike Sutton were early favorites, especially when they announced their intention to buy said "Camry." They reasoned that when it comes to Jeep Cherokees, a late '90s vintage would make the most sense, as it would be fitted with sturdier axles, plus airbags they could sell to pad the budget. But as Benn glanced over a Craigslist ad for an '88 XJ, his seasoned eye caught something: lockable hubs on the front axle, not factory Cherokee equipment. The seller had neglected to mention in the ad that the Jeep sat on the burlier running gear from a '79 Bronco, complete with shorter gears and locked front and rear differentials. In the cons column: The fuel tank had been relocated to the cargo area and fixed in place with fabric ratchet straps, the windshield was spider-webbed, and there was a distinct lack of doors. They snatched up their backwoods mash-up for \$800.

Looking to maximize agility and minimize parts cost, Pund and assistant tech editor David Beard set their hearts on a Suzuki



Jeep Cherokee
[+] If you could put a price on potential, we couldn't afford it.
[-] Sometimes even cheap stuff is worth its price.
[=] It sure would be nice to put a price on potential. Can we at least try?

Samurai. They found one with an external roll cage that the seller told them "doesn't look pretty, but that's because I know it works." That pitch apparently worked for other potential buyers, because it was sold out from under them. They found another that the seller said didn't run so well because "it got stolen for a year and they didn't take very good care of it." Ultimately, the Pund/Beard team laid out \$1200 for a 1990 Geo Tracker with a three-inch lift and an odo showing 130,000 miles. After a quick vacuuming, some Meguiar's on the dash, and a loving exterior wash, it looked like an honest \$3000 car—right up until your humble narrator did a cannonball



Above left: Fearsome crawler crawls over construction detritus. Left: Sutton crawls under fearsome crawler. Bottom left: Stripped-out interior with fun starter switches. (Not shown: creeper-crawlies.)



onto the Tracker's hood, because who needs a hood?

Our leaking liabilities successfully registered and insured, we set our schedule: We'd trundle 60 miles west to Bundy Hill, a 350-acre gravel-pit-cum-off-road-park in Jerome, Michigan. After a few days for recuperation and repairs, we'd long-haul 220 miles north-west to the dunes at Silver Lake State Park along Lake Michigan.

And then one morning we arrived at the office to find an old Land Rover, sans front bumper. Wanting in on the fun, creative director Darin Johnson had emailed a Craigslist link to editor-in-chief Alterman asking if he could dark-horse a Discovery into the competition. In retrospect, the one-word reply, "Boom," might not have been permission so much as a prediction for the outcome. Rather than seek clarification from the boss, Johnson found and purchased a 2004 Disco near Chicago. While the rest of us worried about how many more heartbeats our rigs might have left, Johnson drove it the 300 miles home, then another 200 miles the following weekend visiting family in northern Michigan. It was there that it developed an ominous knock, requiring photo assistant Charley Ladd to rescue his teammate and tow the WasteLand Rover back to the office. And so began *Car and Driver's* fourth quasi-periodic beater challenge.

4. 1988 JEEP CHEROKEE

Formidable as Benn and Sutton's Jeep might have been, it also seemed to have been parked in a bog at some point in its life and then disassembled and put back together while fully submerged. In rebuilding both axles, the team had to fabricate a tool to reach into the housings to scrape out all the mud. To check the fluid in their transfer case, they had to punch a screwdriver through a thick crust of Mother Earth *inside* the drain plug. But if any vehicle can run on equal parts oil and soil, it's a Jeep.

And if any team was going to resurrect a fossil, it would be Benn and Sutton. They rebuilt their front suspension, made a variety of components for the rear, modified the steering linkage, fabricated brackets to mount new seats to their rusty floor, and built a frame to attach belts to. In any contest of speed, knowledge and talent can sometimes offset a bigger budget.

Sometimes.

The Jeep started off the cheapest but ended up costing the most: \$2930, all in. (Features editor Jeff Sabatini, arbitrator for the contest, had initially decreed that wear and safety items wouldn't be counted, but then changed his mind. We changed his title to "arbitrarian.") At least they had a few freebies: A call to BFGoodrich turned up a set of All-Terrain KO2 tires for each vehicle, and Optima donated Red Top batteries for every competitor.

It came as little surprise that the Jeep was the most miserable



Bottom right: The cab, settling from a broken body mount, bound the shift linkage and trapped us in park. As with the Jeep, we fixed it with a hammer, which would have been useful for beating sense into certain staffers.

to drive on the street, with its occupants donning rain suits, earplugs, and goggles on the damp drive to Bundy as if riding top-side on an Alaskan pollock trawler. All were awed when shortly after their arrival, Benn crawled beneath the Cherokee with a hammer to shift the transfer case into low range, having run out of time to repair its damaged linkage.

We started with dirt drags on a strip that had been reduced by an overnight downpour to more of a mud lake. Here, the Jeep finished last, its locked differentials clawing at the muck but its 4.0-liter straight-six reduced from its original 177 horsepower to the approximate output of a Lawnboy by the long-term ingestion of several cubic yards of dirt, possibly including the partial jawbone of a yet-undiscovered sauropod. At our next stop, a timed obstacle course, the John Deere Jeep missed a turn and plunged into a hood-deep water hazard that Bundy Hill's owner had cautioned us about, predicting that none of our trucks could cross it. Not only did Benn and Sutton make it through, they somehow did so without getting soaked despite being in a vehicle with no doors. Fluid dynamics had finally turned in their favor.

On the second run, the welded front diff forced them to make a three-point turn on the course's tightest corner, costing time. But upon completion, they scrambled with ease over a pile of concrete construction debris that we'd identified as a bonus obstacle.

Ford F-150
[+] Complete lack of concern about ground clearance.
[-] That damp feeling you get when camping in humid climates—and that was before we drove through any water.
[=] Fun for those with high pain tolerance.

Unfortunately for the Jeep team, the light faded and the park closed before we hit any trails on which Toledo's Thunder surely would have left at least a couple of its competitors behind. And their transfer case ground its internals back into raw material en route to Silver Lake, leaving them with a DNF and a front-wheel-drive rig that Sabatini gleefully christened the "Two-by-Four." A Cherokee, even one less crazy than this, might have won this contest based on potential, but, as Sutton noted, "Maybe that 'Open 24 Hours' sign on the hood was an omen we shouldn't have ignored."

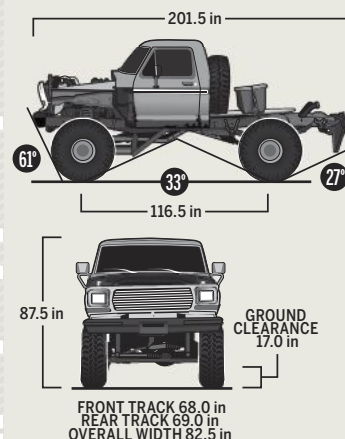


	1979 FORD F-150 CUSTOM	1990 GEO TRACKER	1988 JEEP CHEROKEE	2004 LAND ROVER DISCOVERY
TOTAL COST PURCHASE PRICE	\$2367 \$1500	\$1944 \$1200	\$2930 \$800	\$2413 \$1500
POWERTRAIN ENGINE	pushrod 16-valve V-8 351 cu in (5752 cc)	SOHC 8-valve inline-4 97 cu in (1586 cc)	pushrod 12-valve inline-6 242 cu in (3962 cc)	pushrod 16-valve V-8 278 cu in (4554 cc)
POWER HP @ RPM	135 @ 2800	80 @ 5400	177 @ 4500	217 @ 4750
TORQUE LB-FT @ RPM	274 @ 1400	94 @ 3300	224 @ 2500	300 @ 2600
LB PER HP	34.1	30.9	21.7	22.5
DRIVELINE TRANSMISSION	3-speed automatic rear/4wd	3-speed automatic rear/4wd	4-speed automatic front/rear/4wd	4-speed automatic all
DRIVEN WHEELS	3.50	4.62	4.88, locked	3.54
AXLE RATIO:1				
CHASSIS SUSPENSION	F: rigid axle, coil springs, anti-roll bar R: rigid axle, leaf springs	F: struts, coil springs, anti-roll bar R: rigid axle, coil springs	F: rigid axle, coil springs R: rigid axle, leaf springs	F: rigid axle, coil springs, anti-roll bar R: rigid axle, coil springs, anti-roll bar
BRAKES	F: 11.7-inch vented disc R: 12.7-inch drum	F: 11.4-inch vented disc R: 8.7-inch drum	F: 11.0-inch vented disc R: 10.0-inch drum	F: 11.7-inch vented disc R: 12.0-inch disc
TIRES	Interco Irok Super Swamper 39.5X13.5R-15LT M+S	BFGoodrich All-Terrain T/A KO2 30X9.5R-15LT 104S M+S	BFGoodrich All-Terrain T/A KO2 35X12.5R-15LT 113Q M+S	BFGoodrich All-Terrain T/A KO2 LT265/60R-18 119/116S M+S

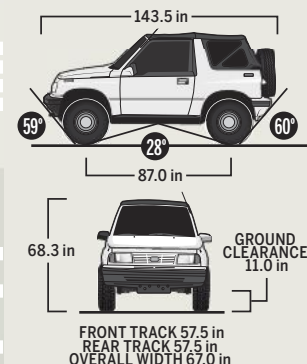
CAR AND DRIVER TEST RESULTS

ACCELERATION				
0-30 MPH	5.0 sec	3.8 sec	-	3.5 sec
0-60 MPH	19.1 sec	14.9 sec	-	10.9 sec
0-90 MPH	-	-	-	29.6 sec
1/4-MILE @ MPH	21.5 sec @ 62	20.2 sec @ 65	-	18.2 sec @ 76
ROLLING START, 5-60 MPH	17.9 sec	15.5 sec	-	11.0 sec
TOP GEAR, 30-50 MPH	8.2 sec	7.0 sec	-	5.1 sec
TOP GEAR, 50-70 MPH	-	15.2 sec	-	7.3 sec
TOP SPEED	71 mph (fear ltd)	78 mph (drag ltd)	0 mph (transfer case ltd)	99 mph (gov ltd)
CHASSIS				
BRAKING, 70-0 MPH	372 feet	252 feet	-	241 feet
ROADHOLDING, 300-FT-DIA SKIDPAD	0.50 g	0.60 g	-	0.63 g
WEIGHT				
CURB	4597 lb	2473 lb	3848 lb	4891 lb
%FRONT/%REAR	60.7/39.3	54.1/45.9	56.0/44.0	44.2/55.8
FUEL				
TANK	19.2 gal	11.1 gal	20.0 gal	24.6 gal
RATING	87 octane	87 octane	87 octane	91 octane
EPA COMBINED/CITY/HWY	not/very/good mpg	22/21/23 mpg	16/15/20 mpg	12/11/14 mpg
C/D 200-MILE TRIP	10 mpg	21 mpg	-	12 mpg
SOUND LEVEL				
IDLE	66 dBA	63 dBA	-	47 dBA
FULL THROTTLE	93 dBA	85 dBA	-	75 dBA
70-MPH CRUISE	85 dBA	83 dBA	-	71 dBA
ODDS AND ENDS				
PAVEMENT-STAIN	100%	17%	10%	4%
FLUIDS REPLACED	3.5 gal	4.1 gal	15.8 gal	9.0 gal
ZIP TIES USED	67	0	10	4
TIME INVESTED	61 man-hr	90 man-hr	350 man-hr	70 man-hr
TIMES VEHICLE DREW BLOOD	3	5	12	2
SNAPPED BOLTS	0	3	0	0
TIMES STUCK	1	1	0	1
TIMES DISABLED	1	0	1	0
LARGEST RUST HOLE	71 sq in	10 sq in	0 sq in	0 sq in
MISSING BODY PANELS	6	0	4	1
COMPLIMENTARY EXTRAS	1 gas-station burrito wrapper	Service manual, transmission filter, ignition coil, 10-disc CD holder	7 gallons of mud, origin uncertain	12 air fresheners
STRAINS OF MOLD	6	0	3	0
UNIDENTIFIED SMELLS	6	0	5	0
TIMED CHALLENGES				
300-FT MUD DRAG RACE	8.9 sec	9.5 sec	9.6 sec	8.8 sec
PIT TRASH OBSTACLE COURSE	1 min 20 sec	1 min 28 sec	1 min 47 sec	1 min 55 sec
SILVER LAKE PERIMETER LAP	7 min 37 sec	9 min 34 sec	-	7 min 34 sec

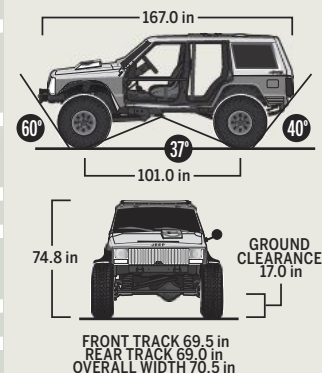
FORD F-150 CUSTOM



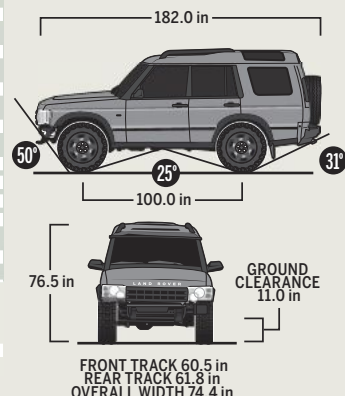
GEO TRACKER



JEEP CHEROKEE



LAND ROVER DISCOVERY



3. 1979 FORD F-150

As Jacquot steered our truck around a deer carcass in the seller's yard on the test drive, the dude pointed out a pair of sandhill cranes on a nearby hilltop, noting, "They call them the sirloin of the sky." Shazam! Our truck had a name. "Sirloin of the Sky" got shortened to "Sirloin," and then road warrior Max Mortimer inserted a space, making it "Sir Loin." We traced Sir Loin's various electrical problems to crusty connections and a bunch of wiring that led nowhere. We improved a stalling issue by advancing the timing to an indicated 40 degrees before top dead center—a guess, actually, due to a spun crank damper, a loose timing chain, or both.

Sir Loin's 44s were not only dry-rotted—a lookup of their DOT number revealed that they popped from their molds in 1994—but, at 18 inches, they were so wide that the inside-shoulder tread blocks grabbed the frame and shook the whole truck at anything more than half steering lock. The largest KO2 is just 35 inches, and so Interco, manufacturer of the original Super Swamper, provided a fresh set of 39.5x13.5s. Jacquot hoped that these lighter, smaller tires would give our axles and driveshafts a better chance at survival. Each wheel and tire still weighed 125 pounds, though, giving us well in excess of a quarter-ton of unsprung weight.

Generous spacing of the Super Swampers' gnarly tread blocks gave us unmatched traction off-road. In the drags, Sir Loin finished just 0.1 second behind the Land Rover in spite of eventually logging an on-road zero-to-60-mph time 8.2 seconds slower.

The springs that lofted the truck so high had the compressibility of tungsten. We drove more slowly over the office speed bumps than we normally do in Dodge Vipers and Ferraris, lest we shatter a spinal disc. Hammering over logs and rocks in the obstacle course, the front and rear axles took turns trying to send us into an endo tumble. At any moment the front axle threatened to fold under and send our chins into the dirt, but it held up and instead we won that test handily.

Amped up on adrenaline and shocked to still have 33 distinct, intact vertebrae, we easily clambered over the construction debris at an entirely unreasonable pace. But our win cost us a body-mount bushing, which we replaced the next day with a few scraps of plywood plus some hockey pucks stolen from Beard's office cubicle.



Geo Tracker
[+] A slight lift and matchless maneuverability equal remarkable capability.
[-] Nitrous couldn't have hurt. Well, not soon enough to matter.
[=] Surprisingly, the most sensible mix of capability and affordability.





On the other hand, the axle we sheared on an aggressive hill-climb required actual truck parts to fix.

The F-150's punishing ride made the dunes feel like an all-day car accident. We staged a three-way drag race that climbed and descended five towering dunes over nearly a mile. Sir Loin's tracks through the whoop-de-dos in each trough were notable for the large gaps where the truck had been airborne. In between momentary blackouts and involuntary grunts, though, we never realized the truck had left the ground. Every bump felt like the *Stockholm* hitting the *Andrea Doria*. After a brief ride, Sabatini tumbled out of the truck and, rubbing his back, remarked: "Wow. There's only one word for that: violent."

But he jumped at the chance to climb back in to experience Sir's unmatched water-fording capability. We eventually stopped testing water holes, instead simply charging in without worrying about the consequences. An air intake nearly six feet off the ground is empowering like that. But in our final scoring, water fording didn't matter as much as having body panels or air conditioning. Seems arbitrary, no?

2. 1990 GEO TRACKER

Beard and Pund initially thought their trucklet just needed a tuneup. But when tests showed rampant leaking in all four cylin-

ders and only 30 psi of compression in number three, the tuneup snowballed into an engine rebuild that consumed most of Beard's downtime for two weeks. Its proud owners noted one important thing about Trackers: Parts are cheap. Exhaust valves for just \$6. A muffler for \$25. The engine-rebuild kit—including pistons, rings, bearings, oil pump, and timing belt—was \$245. Crewman Beard noted that, at 70 mph, the 1.6-liter turns at 4100 rpm, surely making it the winner of the "lifetime engine revolutions" category.

With just 80 horsepower, more or less, after the rebuild, Pund and Beard were happy simply not to be in last place for Bundy's mud drags. But then the Geo took second in the obstacle course, before any points were awarded for the extreme rock-crawling bonus pile. So Beard carefully picked his way over the mound, only scraping at the same point Sutton and Benn's extreme Cherokee had. We had already noted the Geo's impressive approach, departure, and breakover angles, but watching it creep up and over the jumbled concrete was a sight. This Japanese jeeplet is just a little under 12 feet long, and when rolling on 30-inch tires, much of its belly is rubber contact patch, giving it the approximate footprint of a leopard slug and the corresponding ability to ooze over nearly anything. And, with its short 87.0-inch wheelbase, the Geo was astoundingly maneuverable, a proper mountain mollusk. As Beard put it, "What the Miata is to the sports-car world, the Tracker is to the off-road world." We agreed it was equivalently adorable, with the butchered-up, lifted Geo winning the appearance vote.

In the vein of Sir Loin, Benn and Sutton had named the Jeep "Spare Rib." After wowing everyone on the obstacle course, Beard christened his Geo the "Deathstalker Scorpion." He was the only one who knew, without consulting Wiki, that the Deathstalker is in fact a really dangerous bug from the deserts of the Middle East.

Likewise, the Geo held the potential to kill or maim. Even as Beard spun celebratory donuts in the mud next to the rock pile,



the Tracker was starting to sag on its rusty body mounts. Over the course of two days at the Silver Lake sand dunes, whomping and slamming over crests and bumps, it ultimately settled so low that the tailgate wouldn't open, as it had sunk below the top of the bumper. Recall, though, that Tracker parts are cheap. Beard has already located a whole new body for just \$175.

1. 2004 LAND ROVER DISCOVERY

Like the Geo, the Rover looked relatively tame, but it was not to be underestimated, especially if you happened to be cocooned in its leather-lined seven-seat interior. While the Jeep and Ford were missing a significant number of body panels, the daggy Disco still had frosty A/C, a power driver's seat (plus frozen motors beneath the passenger's seat), and wood dash trim. The only wood in any other competitor was clamped between hockey pucks in Sir Loin's makeshift body mount.

The ticking that sounded so much like rod-knock turned out to be a new power-steering pump, which was replaced after being identified as defective. Johnson and Ladd also replaced an ignition coil and the plug wires, along with multiple oxygen sensors. In a demonstration of the team's priorities, they allocated \$150 for a new stereo. Another ticking noise believed to be a damaged pushrod endured throughout the test, though, earning the Land Rover the nickname "Timex." The main thing these utes are really good at is inspiring nicknames.

The metronomic soundtrack didn't slow Timex much. Its 10.9-second zero-to-60 time is just 0.8 slower than what we originally recorded in 2001. Both at Bundy Hill and at the dunes, on hills where the Arabian Insect struggled with power and Sir Loin struggled with power and occu-

Land Rover Discovery
[+] Doors.
Leather! Power seats (one of them, anyway).
[-] The only team too afraid to attempt the construction-debris obstacle.
[=] Our scoring system was deeply flawed.





FINAL RESULTS

Shell
V-Power
NITRO+
Premium Gasoline
The Official Fuel of
CAR AND DRIVER

▶ 2004 LAND ROVER DISCOVERY
1979 FORD F-150 CUSTOM
1990 GEO TRACKER
1988 JEEP CHEROKEE

Maximum points available

	RANK	1	2	3	4
VEHICLE					
COST	6	3	6	4	2
MUD DRAG RACE	6	6	3	4	2
OBSTACLE COURSE	6	2	4	6	3
DUNE RACE	6	3	4	6	0
SILVER LAKE PERIMETER	6	6	3	4	0
ROAD DRIVE	6	6	4	3	2
AMENITIES	3	3	2	1.5	1
APPEARANCE	3	2	3	1	1.5
BUNDY HILL DEMERITS	—	0	-1	-2	-2
SILVER LAKE DEMERITS	—	-1	0	0	0
TOTAL	42	30	28	27.5	9.5

These objective scores are calculated from the test results and challenge performance as measured by Sabatini's unreliable stopwatch.

Opposite: Johnson uses his Rover's belly as a road grader, rounding off crests of mud and sand. Above: One of the rare moments when anyone in the Disco wished they were in the Ford.

pant self-preservation, the Rover's only concern was clearance. But it had enough grunt that, were it snagged on a crest or submerged rock, it would simply power through.

It was easily the fastest, topping out at 99 mph where the Deathstalker Geo hit only 78 and Sir Loin wobbled to a terrifying 71 (terrifying because the F-150's first stop from 70 mph took 450 feet). Spare Rib, the junker Jeep, tentatively wandered up to an observed 65 mph while it was dining on its transfer case, but certain life-insurance stipulations prevented us from taking the front-drive Cherokee to the track for official verification.

Johnson and Ladd won the drive to Silver Lake by more than a half-hour, cool and comfortable, texting out a gloating pic of a sweaty beer pitcher while the rest of the field plodded across the state in sweltering August heat. When Sabatini suggested they use their time to do some reconnaissance (expecting the art boss to be concerned with photos), Johnson replied, "Find beer: Check."



Awhile later came another picture of him golfing. "Find golf course: Check. Fore!" Deep karmic thunderclouds were building, we were certain.

Looking to create an off-road analogue to Lightning Lap, we mapped out a three-mile course around the perimeter of the Silver Lake dunes. The trucks set off at one-minute intervals to avoid the temptation to swap paint, but the field immediately bunched up when all three failed to crest the first dune, backing down and charging back up past one another. Sir Loin left first, thrashing its occupants around like salt in a shaker for a 7-minute, 37-second lap. One minute later, the Geo hadn't materialized, giving the towering Ford the lead and presumed victory. Another 40 seconds later, the Tracker still missing, the Disco nosed over the last crest, pushrod clacking furiously, and ripped down the final dune for the win with a 7:34. Karma had failed to avenge us. Its power and speed also made the Rover our overall winner, even as its relatively low ride height likely would have hindered it in a competition more biased toward serious rock crawling.

But just as Beard lined up a new Tracker body, Rovernaut Johnson has already purchased a lift kit. Jacquot and I have stolen more hockey pucks from Beard for our Sir Loin, and Benn is stockpiling parts for his munched transfer case. Our flotilla of off-road beaters delivered so much fun for the buck that all four have been purchased back from the company by staffers eager for more wheelin'. God willing. ■



Beverly Hills Butt Lift

In style and character, the Porsche **Panamera** moves closer to the four-door 911 ideal. *by Eric Tingwall*

▼
THE ORIGINAL PANAMERA brought new meaning to the phrase “dragg’n wagon” when it made its debut in 2009. The Porsche hatchback with a little extra junk in the trunk also made light work of stoplight sprints. It charged hard, scythed through curves, and swallowed highway miles whole, all while appearing to wear a loaded diaper.

So it’s easy to assume that the second-generation Panamera’s primary mission is to do the cosmetic work that finally sets things right. With a lower roofline, a taller rear end, shapelier hips, and horizontal graphics that visually widen the car, the Panamera now looks like the four-door 911 it aspires to be. Yet the bodywork is actually the sidebar to, well, pretty much everything else. The 2017 Panamera is every bit as fresh as the original, debuting a new architecture, transmission, and interior, and a pair of engines that will spread across the Porsche lineup and elsewhere within the Volkswagen Group.

[+] Drives like a Porsche, no more bubble butt. [-] Actually, can we have our buttons back?

At launch, the hottest ticket is the \$147,950 Panamera Turbo. Its 4.0-liter twin-turbo V-8 can make up to 550 horsepower and 567 pound-feet of torque, or it can close the valves and shut off fuel to four of its cylinders to reduce consumption. Despite basic similarities to the engine used in the Audi A8, S6, S7, and S8 and the Bentley Continental, this is an all-new V-8 developed by Porsche. It’s the brand’s first use of a “hot-V” design, shortening the run for the exhaust gases from the cylinder heads to the turbines. Centering the turbos in the V improves engine response and also allows mounting the engine lower in the car.

Stomp the right pedal, and the Panamera Turbo lunges off the line with a strong low-end pull that never relents. The EA825 engine delivers acrobatic flexibility between its torque peak at 1960 rpm and the 6800-rpm fuel cutoff, always returning from off-throttle lulls with pent-up ferocity. It is far more animated, slightly gruffer, and—with the optional sport exhaust—louder than Audi’s 4.0-liter V-8.

One step down the ladder, the \$100,950 Panamera 4S replaces the previous model’s 3.0-liter twin-turbo V-6 with a 2.9-liter

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unit good for 440 horsepower. This new engine, code-named EA839, was developed by Audi and derived from the single-turbo 3.0-liter V-6 that will power the upcoming Audi S4. Its atypical 90-degree cylinder-bank angle also accommodates a pair of turbochargers in the valley between the cylinders, using a balance shaft to smooth out its vibrations. Our experience with the 4S was limited to an anticlimactic slow lap in traffic around Tegernsee, the touristy German lake near the Austrian border, with just enough seat time to determine that, yes, it does indeed have an internal-combustion engine.

Both engines drive all four wheels through a new eight-speed dual-clutch PDK transmission [see tech highlight]. It lives up to its predecessor as the gold standard in automatic shifting with quick yet graceful gearchanges. However, we did experience one pulse-raising moment in the Turbo when a clutch hesitated to fully engage during a left-hand turn from a stop just as oncoming traffic barreled toward us.

The Panamera's new MSB platform employs more aluminum in its unibody than before, though, at 4400 to 4500 pounds, curb weight remains the same due to additional content. This architecture will eventually spawn long-wheelbase and station-wagon Panamera bodies, plus at least one Bentley two-door, although MSB isn't flexible enough to accommodate the long-rumored smaller Porsche four-door.

All four occupants sit closer to the ground in the new Panamera. That allows rear-seat headroom to remain unchanged even as Porsche nipped the roofline by as much as 0.8 inch. The new car is also 1.3 inches longer overall, with all but two-tenths of an inch used to stretch the wheelbase. The rear buckets, every bit as comfortable and supportive as the fronts, provide ample legroom, though a 6-foot-3-inch rider will brush his hair on the headliner, and the space only gets tighter as you recline the rear backrest to a comfortable position.

Coil springs and adaptive dampers are standard on the 4S,

Top left: Because the previous Panamera used up the world's supply of buttons, there are none left for the new car's interior. Above left: Is that a 911 Carrera 4?

while the Turbo rides on air springs that now have a third chamber to offer a wider range of spring rates. Optional chassis technology borrowed from the 911 includes rear-wheel steering and the adaptive anti-roll bars of Porsche Dynamic Chassis Control. The loaded Turbo we drove felt stable

and planted when pushed and contentedly comfortable at slower paces, at least on Germany's well-maintained roads. Cornering comes naturally, with minimal roll and relatively high grip from Pirelli P Zero rubber on optional 21-inch wheels. The Panamera now drives more like the 911, the icon that serves as the driving-dynamics beacon for every vehicle that Porsche builds. That's partly due to flatter body control and more nimble low-speed turn-in, but it's also helped by the fact that the 911 continues to slide toward the grand-touring end of the sports-car spectrum.

There is still room for improvement. The variable-ratio steering feels too light on-center, and the brake pedal is soft at the top of its travel. Still, the Panamera is far and away the driver's choice in a segment of cushy, squishy limos. It drives as if it were much smaller and with far better control of body motions than an A8, a BMW 7-series, or a Mercedes-Benz S-class.

Those competitors may offer a superior rear-seat experience, but the Panamera's cockpit is as fetching as the sheetmetal and properly loaded for a time when tech and luxury are one and the same. The old Panamera's button-festooned center console has been usurped by a slightly less daunting number of touch-sensitive icons glowing through a glossy-black slab. The controls for sport mode, the suspension setting, and stability control require a firm press and respond with a convincing simulated click. Compared with the old arrangement, this system makes it harder to find your target by touch, but at least there's enough feedback to confirm that you've pressed something. Strangely, though, the keys higher on the center console react to the lightest taps and don't deliver the

2017 PORSCHE PANAMERA

VEHICLE TYPE: front-engine, all-wheel-drive, 4-passenger, 4-door hatchback

BASE PRICE: \$100,950–\$147,950

ENGINES: twin-turbocharged and intercooled DOHC 24-valve 4.0-liter V-6, 440 hp, 405 lb-ft; twin-turbocharged and intercooled DOHC 32-valve 4.0-liter V-8, 550 hp, 567 lb-ft

TRANSMISSION: 8-speed dual-clutch automatic with manual shifting mode

DIMENSIONS

WHEELBASE: 116.1 in

LENGTH: 198.8 in

WIDTH: 76.3 in

HEIGHT: 56.0–56.2 in

CARGO VOLUME: 17 cu ft

CURB WEIGHT: 4400–4500 lb

PERFORMANCE

(C/D EST)

ZERO TO 60 MPH: 3.2–4.0 sec

ZERO TO 100 MPH: 8.0–10.6 sec

1/4-MILE: 11.6–12.6 sec

TOP SPEED: 179–190 mph

FUEL ECONOMY

(C/D EST)

EPA COMBINED/CITY/

HWY: 20–22/15–17/

25–28 mpg

same satisfying haptic feedback. Worse, the center touchscreen is plagued by disorganized screen layouts, options buried deep in oddly labeled menus, and touch points that are simply too small.

The central analog tachometer is flanked by two 7.0-inch screens; a 12.3-inch touchscreen manages the infotainment duties. The latter also controls the central air vent, so you end up poking and swiping at a flat glass pane to redirect or block the airflow from the vent that sits directly below the touchscreen. It can only be a matter of time until touchscreen-controlled power windows become a reality.

Applying technology more appropriately, Porsche InnoDrive is an adaptive cruise-control system that reacts to changing speed limits and uses high-definition map data to look almost two miles down the road. With that foresight, it will downshift before the road begins to climb and decelerate the vehicle when a curve needs to be taken more slowly than the current set speed. With a route programmed into the navigation system, the car will slow itself as you approach an upcoming turn. Switching the car into sport mode causes it to corner, brake, and accelerate more aggressively than the average person drives.

InnoDrive appears to have a greater understanding of the road ahead than Tesla's Autopilot, but it doesn't make any attempt to steer the car. On Germany's autobahn, it smoothed the schizophrenic speed-limit changes with the gentle transitions of a human driver, yet when a dawdling Peugeot finally moved to the right in the unrestricted sections, it accelerated forcefully—just as we would in a 550-hp Porsche—to the system's max of 130 mph. Of course, that last part won't happen in the United States, and InnoDrive won't be available when the first Panameras arrive here in January, as Porsche is still fine-tuning the system for our laws and lawyers.

Porsche's second-generation Panamera is built around newly developed hardware, but it all comes together in a package that drives similarly to the original. That's no bad thing, considering that the first Panamera ran a swift pace with the utmost composure. The Panamera remains a unique proposition in a segment that otherwise follows a rigid formula. Even if the tech isn't fully baked, Porsche's alternative solution remains the choice for drivers.

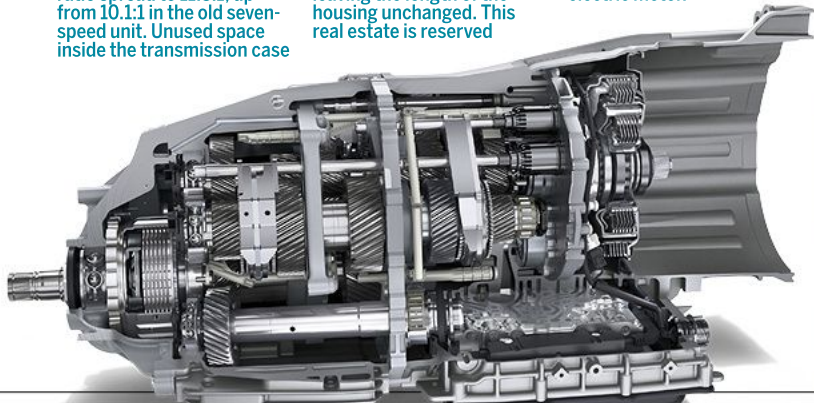
tech highlight

CASE SPACE

The eighth gear in Porsche's new PDK transmission aids efficiency by extending the ratio spread to 11.3:1, up from 10.1:1 in the old seven-speed unit. Unused space inside the transmission case

allows future models to improve efficiency even further. By switching from a two-shaft design to a four-shaft arrangement for the new gearbox, engineers shortened the length of the internals by 6.1 inches while leaving the length of the housing unchanged. This real estate is reserved

for an electric motor in the inevitable hybrid Panameras. A successor to the plug-in e-Hybrid has already been announced, but we've been led to believe that the upcoming Panamera Turbo S also will be juiced by an electric motor.



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TESTED



How the Chaste Make Haste

The 2017 Ford **Fusion Sport** offers 325 horsepower to everyman. *by Kevin A. Wilson*

▼ **REMEMBER WHEN** Detroit-brand family sedans had horsepower to spare? Those good ol' days are back. Ford's four-door Fusion Sport offers 325 horsepower from its twin-turbo 2.7-liter V-6—enough to erase those midlife, mid-size-sedan blues in a scant 5.1 seconds. That's how long this furious Fusion needs to hit 60 mph; it'll clobber the quarter-mile in 13.7 seconds at 101 mph. The 278-hp V-6 Honda Accord Sport, by contrast, previously stood out by clocking 5.8 seconds to 60 mph and 14.4 in the quarter. And the Ford's turbocharged thrust greatly hastens two-lane passing (the Accord's 50-to-70-mph time was 0.7 second slower). But the freshness doesn't stop with the engine.

The mid-term update for '17 brings exterior-styling amendments, an upgraded interior, and, most appealing, this Sport model, which gives Fusion bragging rights as the first modern family sedan to bust through the 300-hp barrier. Wisely, Ford makes all-wheel drive standard and installs an adept computer-controlled adaptive-damping system with pothole-mitigation abilities. The system adjusts the dampers 500 times per second, slowing rebound, for example, when it detects a wheel falling into a hole, lessening impact harshness. The all-wheel-drive system favors front-drive operation until it detects wheelslip, but that's easy enough to induce when you've got 380 pound-feet of torque under your right foot.



SHIFTY

All 2017 Fusions get this new rotary transmission shifter. But only the Sport model gets the "S" button in the center.

[+] Goes faster than it looks, well-calibrated electronic damping. [-] "Sport" composure erodes beyond seven-tenths.

Outside, the Sport wears a black mesh grille with a chrome surround, a subtly integrated decklid spoiler, and four exhaust tips. The standard charcoal-gray interior décor employs leather, suede, contrast stitching, matte-finished metal, and faux-carbon-fiber accents.

Push the "S" button in the center of the new dial-operated shifter to sharpen the Sport's reflexes. It tautens the adaptive-damping system, increases steering effort, quickens throttle response, and amps up the artificially enhanced engine sounds. The S button also engages a more aggressive shift program from the six-speed automatic and gives you more control through the standard paddle shifters. The car upshifts at 6000 rpm no matter what you do with the paddles, but it will hold gears through corners and rev-match downshifts. None of this changes test-track performance measures one whit, but it does make driving more fun. The adaptive dampers, especially, do a great job of supporting aggressive assaults on curving roads while maintaining a ride quality that wouldn't alarm your grandmother.

We tested two Fusion Sports, one with standard Goodyear all-season rubber (reflected in the spec panel) and another with the optional \$195 summer-only Continentals, both sized 235/40 on the Sport's 19-inch aluminum wheels. The stickier Contis improved skidpad roadholding from 0.84 g to 0.89 and pared the 70-to-zero braking distance from a middling 178 feet to a tidy 155. That's worth knowing as long as you're willing to buy winter tires in colder climes to make the car more usable year-round.

Ford's commitment to Sport only goes so far, though. The steering feel is lackluster and the brake-pedal travel is long and gives little feedback. The car feels every bit of its 4128 pounds, leaving an overall impression of a smaller Taurus SHO. As it approaches its limits, the Fusion Sport can feel indecisive and clumsy in the coordination of its all-wheel-drive, transmission, and steering programs.

These are quibbles few Ford Fusion Sport drivers will notice as they enjoy a Q-ship that blends unobtrusively into the flow of traffic until, suddenly, it doesn't.

2017 FORD FUSION SPORT

VEHICLE TYPE: front-engine, all-wheel-drive, 5-passenger, 4-door sedan

PRICE AS TESTED: \$41,470

BASE PRICE: \$34,470

ENGINE TYPE: twin-turbocharged and intercooled DOHC 24-valve V-6, iron block and aluminum heads, direct fuel injection

DISPLACEMENT: 164 cu in, 2694 cc

POWER: 325 hp @ 5500 rpm

TORQUE: 380 lb-ft @ 3500 rpm

TRANSMISSION: 6-speed automatic with manual shifting mode

DIMENSIONS

WHEELBASE: 112.2 in

LENGTH: 191.8 in

WIDTH: 72.9 in

HEIGHT: 58.2 in

PASSENGER VOLUME: 106 cu ft

TRUNK VOLUME: 16 cu ft

CURB WEIGHT: 4128 lb

C/D TEST RESULTS

ZERO TO 60 MPH: 5.1 sec

ZERO TO 100 MPH: 13.3 sec

ZERO TO 130 MPH: 24.7 sec

ROLLING START, 5-60 MPH: 5.8 sec

1/4-MILE: 13.7 sec @ 101 mph

TOP SPEED: 131 mph (governor limited)

BRAKING, 70-0 MPH: 178 ft

ROADHOLDING, 300-FT-DIA SKIDPAD: 0.84 g

FUEL ECONOMY

EPA COMBINED/CITY/HWY: 20/17/26 mpg

C/D OBSERVED: 20 mpg

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TESTED

Neither Snow nor Rain nor Heat nor Gloom of Night

Will the lifted, all-wheel-drive 2017 **Golf Alltrack** wagon deliver crossover-sales success for Volkswagen? *_by Jeff Sabatini*

▼
IT HAPPENS EVERY FEW YEARS: An old letter turns up in the mail, delivered late. Really late. In 2009, Britain's Royal Mail delivered a love letter sent during World War II to a military base 64 years after it was written. Three letters addressed to a New York woman in 1969—including two birthday cards—spent 45 years missing before they wound up in her old mailbox in 2014. And a postcard mailed in France in 1877 finally arrived after taking 138 years to travel all of six miles.

The letter we wonder about is also presumed lost. It's the one written by Volkswagen's U.S. outpost, begging the Germans for more crossover models, posthaste. We're guessing it was mailed sometime in 2008, shortly after VW introduced the small and expensive Tiguan and found American buyers not as enthusiastic about it as we were. Or maybe it wasn't dispatched until 2012, when Tig sales began to grow coincident with a mid-life-cycle refresh and the post-recession fervor for any and every new crossover, even the Buick Encore. But surely this letter was sent, just as surely as

**[+] Drives like a Golf, delivers AWD for less money than an R.
[-] Off-road pretensions are just that, gets pricey.**

it could not have been received. For here we are with the 2017 model year in full swing, and Wolfsburg continues to take its sweet time with the crossovers.

Indeed, the second-generation Tiguan is still months away, and VW's long-awaited three-row mid-sizer (both are likely 2018 models) doesn't yet have a name. Instead we get the 2017 Golf Alltrack, which is just an all-wheel-drive Golf SportWagen with a bit of a lift, some gratuitous cladding, and a name—if not an exact spelling—purloined from Toyota's past.

Without a hike in the seating position or a raised roof, the Alltrack feels not even a little like a crossover. The lift amounts to just 1.4 inches, most of it coming from taller wheels and tires, though VW says the Alltrack does have longer springs and dampers. Its selectable off-road drive mode (one of four: normal, sport, custom, and off-road) engages hill-descent control and futzes with the throttle and transmission calibrations, yet it's meant mostly for bouncing along two-tracks, which we did. And yes, we could appreciate the Alltrack's higher tolerance for rutted roads, commensurate with its increased ground clearance.

What we didn't feel—thankfully—was any other significant difference from any other regular Golf. The light and accurate

Drivelines

2017 VOLKSWAGEN GOLF ALLTRACK SEL

VEHICLE TYPE: front-engine, all-wheel-drive, 5-passenger, 4-door hatchback

PRICE AS TESTED: \$35,705

BASE PRICE: \$33,710

ENGINE TYPE: turbocharged and intercooled DOHC

16-valve inline-4, iron block and aluminum head, direct fuel injection

DISPLACEMENT: 110 cu in, 1798 cc

POWER: 170 hp @ 4500 rpm

TORQUE: 199 lb-ft @ 1600 rpm

TRANSMISSION: 6-speed dual-clutch automatic with manual shifting mode

DIMENSIONS

WHEELBASE: 103.5 in

LENGTH: 180.2 in

WIDTH: 70.8 in

HEIGHT: 59.7 in

PASSENGER VOLUME: 94 cu ft

CARGO VOLUME: 30 cu ft

CURB WEIGHT: 3497 lb

steering, the excellent body control, and the way the car flows from one curve to the next all survived this crossover-ication just fine. The same is true for the clean styling, solid build quality, and tasteful interior, none of which were changed in any fashion deserving further comment.

Our test vehicle weighed 3497 pounds, 260 more than the last front-drive SportWagen to cross our scales. But the additional mass made little difference at the test track. Launch control and the extra set of drive wheels helped the Alltrack nip the standard SportWagen by three-tenths of a second in the zero-to-60-mph sprint, at 7.5 seconds, though we measured both cars at 15.9 through the quarter-mile. Slightly wider rubber helped the Alltrack pull a respectable 0.84 g on the skidpad, beating the SportWagen's 0.82. The braking performance was worse than the SportWagen's by six feet, with the Alltrack stopping in 172 feet from 70 mph. Fuel economy is about the only other measurable area in which the Alltrack comes up short, with our observed mileage of just 25 mpg trailing the 26 we achieved in the last front-drive SportWagen we tested. VW compensated for the diminished fuel economy by increasing the tank size in the Alltrack by 1.3 gallons.

Of more importance is an upgraded powertrain, which marries the base Golf's 1.8-liter turbocharged four with the Golf R's driveline. That means the Alltrack gets Volkswagen's six-speed dual-clutch automatic instead of a conventional automatic transmission. While this DSG is no longer the groundbreaking transmission it was in 2003, it still provides more-consistent shifting and delivers a sportier character than a conventional automatic. As in the R, an electronically controlled clutch manages the front-to-rear torque split. The computer can apply the brakes individually to direct torque to the left- or right-side wheels on either axle. But even with this hardware, the Alltrack doesn't drive much like the Golf R thanks to a 122-hp deficit.

Ultimately, Volkswagen is not targeting



The Golf Alltrack is a subtly handsome thing. We think it needs its body dropped by about 1.4 inches and the removal of its cladding to be about perfect.

those looking for a less speedy rally wagon, but it's hoping its Alltrack might convince some of the legions of Subaru buyers to forget about Dieselgate and visit their local VW dealership. There, they will find not only the Alltrack, but also a Golf SportWagen with newly available all-wheel drive.

That one can be had only in lower trim levels, thereby preserving the pricier territory for the Alltrack.

While the Alltrack starts at just \$26,670, that's for a six-speed-manual version, which will not be here until early 2017. Our loaded tester, on the other hand, totaled \$35,705, which seems like quite a lot of money for a car offering only 170 horsepower. Yet it comes with every manner of driver-assistance feature and VW's new infotainment system, complete with Android Auto and Apple CarPlay support, "necessities" to chase mainstream crossover shoppers.

If they fall for this Alltrack ruse, they'll actually be getting an outstanding car, the only serious fault being its single USB port. We imagine Volkswagen USA is dropping that letter to Germany in the mailbox presently.

Shell
V-Power
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Trailer Queen

The flying car may never happen, so here's the Icon A5, a flying boat. *—by Aaron Robinson*

▼ **THE ICON A5 STARTED** as a napkin sketch more than 10 years ago by ex-F-16 jet jock and Icon founder Kirk Hawkins, defying airplane convention with its carlike dashboard, simple controls, and ultrastable flying manners. If you've ever wondered what it'd be like to take off from your bathtub in a Mazda MX-5 Miata with wings, this is as close as you'll probably get.

Starting around \$222,000, the A5 is likely to be the umpteenth vehicle in your household(s), best suited to your isolated lakeside estate where it can serve as a go-to-town vehicle, able to land on either water or, with its retractable wheels deployed, airstrips. A fuel-injected Rotax 912is four-cylinder engine making 100 horsepower turns a three-blade fixed-pitch prop that pushes along the stupendously entertaining amphibious two-seater, which weighs 1080 pounds dry and has a max takeoff weight of 1510 pounds. It'll cruise at around 98 mph for up to four hours on its 20-gallon tank, with either 91-octane pump gas or aviation 100 low-lead aboard. When the flying is done, the wings slide outward and fold back manually so the plane easily fits on a trailer.

Climb onto the A5's wide hull, unlatch the large forward-tilting canopy, and plop into the sculpted pilot's seat. In the cockpit, the automotive inspiration is obvious. The "panel," as they say in planes, looks carlike with a vertical stack of big analog gauges leading up to an angle-of-attack meter at the top. And in fact, the car industry has its fingerprints all over the Icon A5, with key members of its creation team coming from BMW and Honda.

ICON A5

VEHICLE TYPE: mid-engine, pusher-propeller, 2-passenger, tilting-canopy amphibian airplane
BASE PRICE: \$222,000 (est)
ENGINE TYPE: pushrod 8-valve flat-4, aluminum block and heads, port fuel injection
DISPLACEMENT: 83 cu in, 1352 cc
POWER: 100 hp @ 5800 rpm
TORQUE: 97 lb-ft @ 5500 rpm
TRANSMISSION: 1-speed direct drive
DIMENSIONS
LENGTH: 276.0 in
WIDTH: 417.6 in
HEIGHT: 97.2 in
DRY WEIGHT: 1080 lb
MAX TAKEOFF WEIGHT: 1510 lb
PERFORMANCE (MFR'S CLAIM)
RANGE: 360 mi (est)
TOP AIR SPEED: 109 mph

As in a car, you twist a small key to start the overhead Rotax. Once a seaplane is started on the water, it moves; there is no way to slow it except to turn it into a stiff wind. Icon fits a small deployable water rudder in back to help you steer. A sliding lever between the seats is the throttle. Push it forward, put in a little left rudder with the pedals to counter the torque reaction, and the Icon easily comes up on plane. You can skate along a smooth lake like this for hours, but ease back the A5's delicate stick and you're flying.

Nothing is idiot-proof, but Icon aimed for high idiot-resistance. The angle-of-attack meter conveys in one simple gauge the state of lift at the wings. Keep it in the green and all is good—as long as you avoid power lines and trees. Yank the stick back into a stall, which in most aircraft is followed by a heart-stopping plunge, and the A5 just hangs there, the inboard part of the thick, asymmetrical wing stalled but the outboard portion still generating lift. The A5 also resists spinning, another dangerous situation. If all else fails, there's a rocket-deployed parachute that will bring the entire plane down relatively gently.

When you're not trying to crash it, the A5 hums along, skimming the water or the treetops at eye level with the seagulls. Though it's heavy for its class of light-sport aircraft, it's highly maneuverable, with a surprisingly fast roll rate that will stand it on its wing in a 60-degree bank, pressing its occupants into the seats by 2.0 g's. Icon requires a 30-hour training course at its own school in Vacaville, California, to get rookies through the FAA-mandated sport-pilot licensing. Figure at least \$10,000 in training costs.

So even if the flying car may never happen, the Icon proves that a flying boat can be a hilariously fun alternative. ■

[+] No traffic or stoplights, takes the any-idiot approach, trailers easily.
[-] This or a Ferrari, light payload limit, company has had startup troubles.



ergonomics

THE CAR OF PLANE-BOATS

Icon founder Kirk Hawkins wants to move airplanes from the realm of highly technical transportation into the realm of consumer products such as cars and speedboats. The problem: Today's airplanes are designed for tech geeks, he says, while "the car has evolved to fit the human," meaning simpler controls. Thus, the A5 harnessed automotive design in its cockpit, with big analog dials that position the air-speed indicator next to the altimeter, similar to the way a car's speedo is next to the tach, plus a few digital screens, none of which would frighten a Toyota Camry driver. "We didn't intend to make a car cockpit," Hawkins says. "We wanted it to be human-centric, and it evolved into a car dash."

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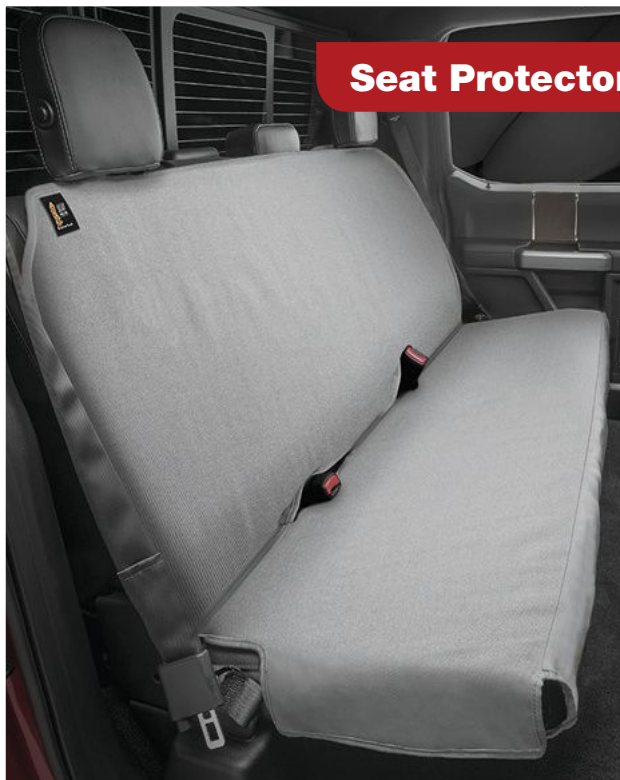
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What I'd Do Differently Marcello Gandini, 78

Lamborghini's stunning Miura was only Marcello Gandini's first claim to car-design immortality. The Countach was his second. Not a bad résumé.

► interview by JOHN PEARLEY HUFFMAN



C/D: What's the most difficult part of your work?

MG: Answering journalists' questions!

■ **You were in your 20s when you became Bertone's chief designer; did you feel as if you were in over your head?**

□ No, I had had fairly relevant experience working on several projects—some personal and some with coachbuilder Marazzi—so I wasn't worried about not being able to deliver. Just that the schedule was very tight for three all-new designs that needed to be completed in time for the Geneva motor show in March 1966.

■ **Your predecessor, Giorgetto Giugiaro, wouldn't work with you. Why?**

□ When I had first met Nuccio Bertone and presented some of my

renderings to him, he seemed to be quite impressed, and he said that he would get back soon. But he didn't. It was a few months later that I came across Bertone at the seaside, and he seemed embarrassed to see me. He mentioned that if he took me on then he would lose his regular designer.

■ **How do you start a new design? Is there one element that you establish first?**

□ It would depend upon the brief and what needs to be done. But more often than not, one would need to start with the packaging, keeping in mind the technical specifications and the powertrain locations.

■ **How difficult is it to translate two-dimensional drawings into satisfying three-dimensional models and, ultimately, cars?**

□ The two-dimensional is only a representation of an image in your mind that is already three-dimensional. It is perhaps more difficult to represent what you imagine on paper.

■ **The Miura and Countach are radically different. You designed both. Which do you prefer?**

□ Personally, I don't have a preference of one over the other. They were designs that reflected the times and the evolving trends in design.

■ **Is there one design of yours that you feel is underrated?**

□ A difficult question to answer. But a personal favorite is the Lancia Stratos HF, for which not only was I responsible for the design of the body but also the chassis and the packaging aspects. It was a most satisfying project.

■ **On the other hand, is there one of your designs that you feel is overrated? That people think is better than you do?**

□ That's for others to judge.

■ **You've been quoted as being more interested in architecture, construction, and the mechanical substance of vehicles. Can you separate design from the mechanical substance?**

□ I believe that you cannot. In fact, it is perhaps one of the most important aspects of design, and the most exciting of forms always follows function.

■ **You've designed a lot of exotic cars. Have you ever actually driven any of the exotic cars that you designed? Were you as happy with how it drove as how it looked?**

□ No. I prefer practical cars for my personal use.

■ **Can a cheap car be as attractive as an expensive one?**

□ Yes, it can be. Looks or design has to be relative to what a car stands for.

■ **Other than cars, what have you enjoyed designing the most?**

□ Helicopters, trucks, and motorcycles.

■ **What other designer, if any, do you admire?**

□ Several, but perhaps the most impressive was Flaminio Bertoni and his designs for Citroën. [Among Bertoni's brilliant Citroën creations were the Traction Avant, 2CV, DS, H Van, and Ami—Ed.]

■ **Would the Lancia Stratos have been a better car if it had been powered by Aurelio Lampredi's Abarth four-cylinder engine?**

□ I believe so, as the four-cylinder Abarth engine was lighter and more powerful than the V-6.

■ **What is it with the hexagons?**

□ It was a way to characterize the functional elements, such as the grille.

■ **How did you come up with the Countach's striking rear wheel arch?**

□ That style of a rear wheel arch was first used in the Lancia Stratos Zero concept car. Wheel arches are an important element in the design of an automobile, and so to develop something distinctive is always an interesting exercise.

■ **You designed a lot of Lamborghinis, but only one Ferrari, the 1973 Dino 308GT4. Would you have liked to create more Ferraris?**

□ I'm quite satisfied with the opportunities that I've had.

■ **Looking back, is there anything you would have done differently?**

□ As with most people, many!

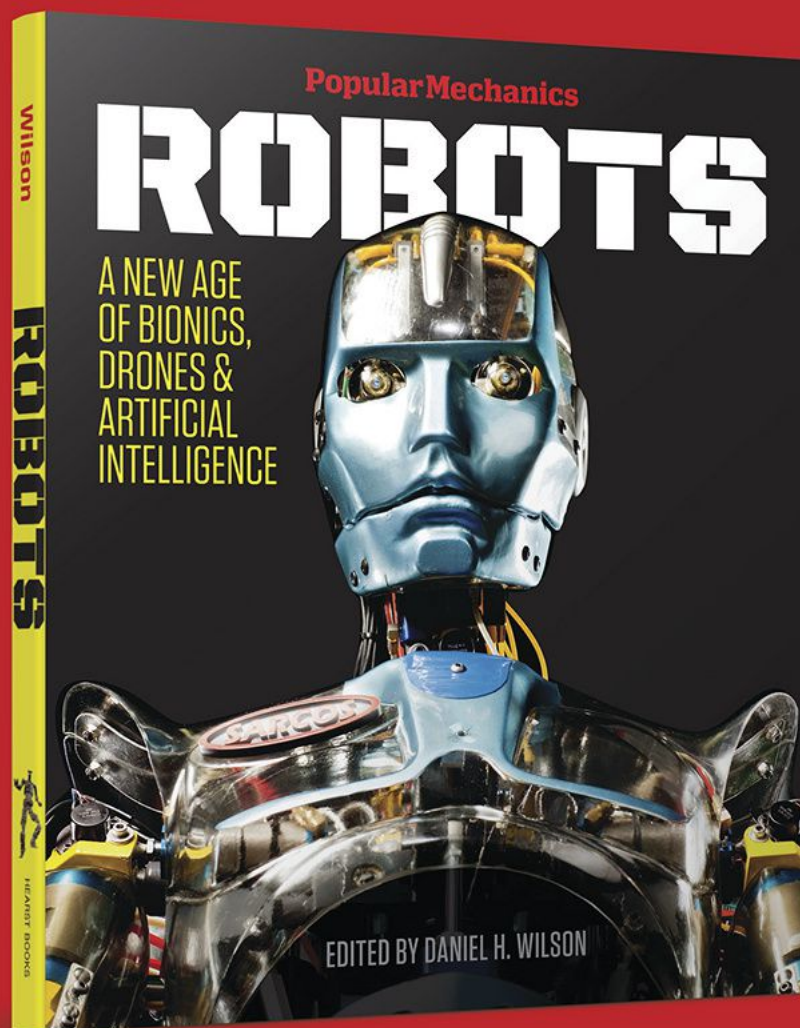
Car and Driver thanks Marzia Gandini for transcribing and translating her father's answers to our questions. ■

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